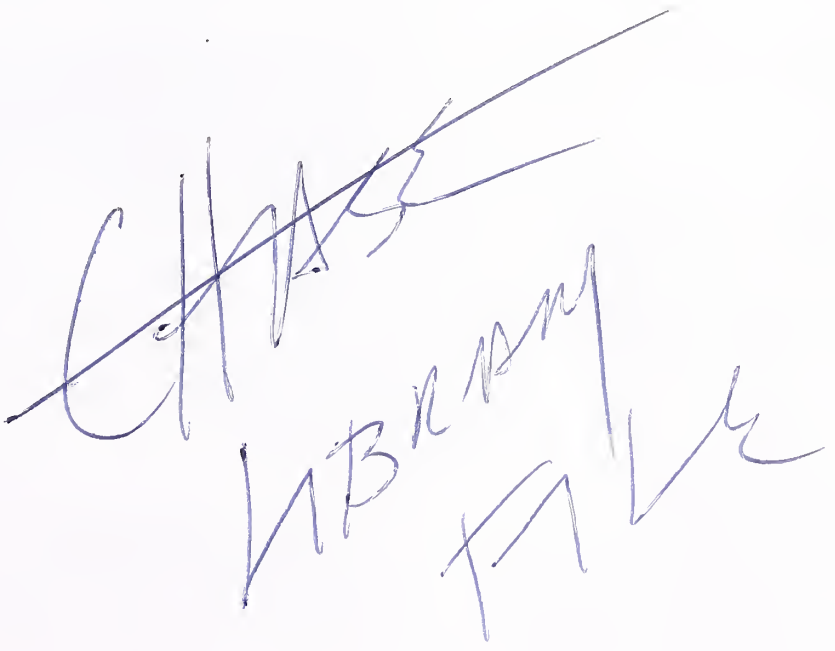
Information Services Opportunities in Cross-Industry Markets, 1994-1999

U.S. Market Analysis Program

Information Services Opportunities in Cross-Industry Markets, 1994-1999

1995



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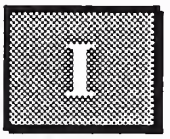


Introduction

A
Purpose and Organization

This report is part of a series of market analysis reports written each year by INPUT on industry and cross-industry sectors of the U.S. information services industry. This report analyzes the cross-industry sectors of the U.S. information services industry.

1. Purpose

The objectives of this report are to:

- Forecast user expenditures on information services during the next five years for each of the seven cross-industry sectors
- Identify and discuss user department directions as they relate to each of the seven cross-industry sectors
- Identify technological issues and trends that are driving the use of information services for the cross-industry sectors
- Discuss the competitive environment in each of the cross-industry sectors

The report provides readers with insights and information that will help to:

- Review the forces shaping their markets
- Develop internal corporate financial projections
- Identify new markets and product and services opportunities
- Assess the competitive trends

- Determine potential market directions
- Assist in prioritizing investments

2. Organization

This report is organized as follows:

- Chapters II through VIII are individual discussions of each of the seven cross-industry sectors. Within each chapter there are five sections.
  - Section A, *Sector Definition*–introduces and defines each of the cross-industry sectors.
  - Section B, *Key Trends and Issues*–discusses the relevant developments and resulting trends having an effect in each cross-industry market.
  - Section C, *Information Services Market Forecast*–presents the information services market forecast by product/service sector and subsector for each cross-industry market.
  - Section D, *Conclusions and Recommendations*–presents market-specific conclusions and recommendations for vendors and users in each cross-industry.
- Appendix A—*Forecast and Reconciliation*—presents numerical tables with detailed 1994-1999 forecasts for each cross-industry, as well as a reconciliation of the market forecast values noted in 1993 and those in this report.

3. Scope and Methodology

This report addresses the U.S. information services industry in seven cross-industry sectors. It includes only noncaptive user expenditures (generally available to vendors). Many large organizations have portions of their information services requirements satisfied by internal divisions. The resulting expenditure is not available for competitive bid by the general vendor community and is not included in INPUT's projections.

B
Cross-industry Sector Definitions

INPUT defines cross-industry information services as packaged functional application solutions that are used by multiple industry sectors. In other words, these application solutions are not vertically-oriented.

For example, accounting, and planning and analysis are functions that are similar enough across all industries to be considered markets in their own right for nonvertical application solutions.

The seven cross-industry sectors identified by INPUT are:

- Accounting
- Human Resources
- Education and Training
- Engineering and Scientific
- Office Systems
- Planning and Analysis
- Sales and Marketing

These sectors or markets involve multi-industry applications rather than industry-specific applications such as wholesale or retail distribution, or insurance.

This year INPUT has written one report encompassing all seven sectors, rather than seven individual reports. The reason for this is that the cross-industry sectors tend to be impacted in a similar way by the same driving forces. A benefit of combining the seven sectors into one report is that it enables readers to compare and contrast the differences among sectors, thereby gaining additional insight into each sector's current status and potential.

C
Product/Service Market Definitions

Cross-industry information services are delivered via applications software products, turnkey systems and transaction processing services. Management support information services such as systems operations, systems integration and professional services, information delivery services and systems software are excluded from cross-industry consideration.

For a more complete discussion of INPUT's information services industry structure and market sector definitions, please refer to the separate volume, INPUT's *Definition of Terms* found in the volume I binder of the 1994 Market Analysis Program reports.

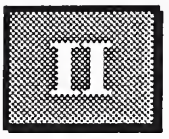
D
Methodology

Data was collected and analyzed from telephone interviews with vendors and user departments representing all cross-industry sectors. In addition, INPUT's library was used as an information resource, as were the results of previous INPUT reports on key aspects of the information services industry.

E
Related Reports

The following reports will provide the readers with additional information related to the cross-industry sectors. They are published annually and include:

- *U.S. Application Solutions Market, Analysis Report* (Includes analyses of applications software products and turnkey systems solutions)
- *U.S. Processing Services Market Analysis Report*
- *U.S. Industry Sector Markets* (15 reports on all major industry sectors, e.g. insurance)



Accounting

A
Sector Definition

By INPUT's definition, the accounting cross-industry sector consists of products and services purchased by multiple industries to serve functions including the following:

- General ledger
- Accounts payable
- Accounts receivable
- Billing/invoicing
- Costing
- Fixed assets
- International accounting (including currency conversion, value-added taxation and consolidation)
- Purchasing
- Taxation

Related applications covered in other sectors include:

- Financial modeling (see the Planning and Analysis Cross-industry Sector report)
- Sales management and order entry (see the Sales and Marketing Cross-industry Sector report)

- Payroll and personnel (see the Human Resources Cross-industry Sector report)

Accounting software applications products and services that are developed and sold to specific industries, such as banking and finance, telecommunications or insurance, are included in sector reports specific to the relevant industry.

B
Key Trends and Issues

INPUT estimates accounting represents at least 20-25% of the total for all cross-industry information services expenditures. Because of its relative practical simplicity and pervasiveness, accounting was among the first business functions to be computerized. Often this was done in-house by teams of accountants and engineers who struggled and eventually succeeded in turning early mainframes into the world's largest adding machines.

The so-called "glass house" crumbled early for accounting applications. Since the mid-1980s it has become prohibitively expensive for companies to develop their own full-fledged accounting solutions in-house. Because this form of development is no longer practical, the issue for companies now is whether to purchase accounting applications that are cross-industrial or industry specific. To address this dilemma, numerous vendors supply core applications that can be fitted with modules for specific needs.

Another issue at the heart of the accounting applications market today is the question of residency. Many corporations continue to ask themselves whether they are content to have their accounting systems centrally located on their legacy systems, or if migrating to a distributed architecture is more desirable. As the backbone application in almost any corporate information system, accounting has been deemed too important to migrate to distributed systems, whose trustworthiness has historically been suspect.

However, this may all be changing. Accounting applications powerhouses such as Global Software, Inc., Lawson Associates, Inc., Ross Systems, Inc., and Dun & Bradstreet Software Services, Inc., are developing or selling integrated accounting packages based upon distributed or client/server architectures. Increasingly, accounting cross-industry users are presented with applications solutions that effectively cut through the heavy chain links forged between them and their mainframes. According to 1993 research by InternationalData Crop., client/server-based

accounting software represented only 3.5% of the expenditures for this applications segment in 1992. This is expected to increase to more than 26% by 1997.

Software vendors themselves sometimes drive users toward client/server technology. Cincinnati-based Frisch's Restaurants, Inc., that manages more than 100 bistros in the midwest, was forced to convert its fixed asset accounting system to client/server when the software vendor stopped supporting this mainframe application. Working with the vendors and a system integrator, Frisch's converted the application to run on networked PCs connected to a Novell Netware server. Fortunately, the new system runs twice as quickly as the mainframe system, with greater efficiency tracking more than 45,000 fixed assets.

Although some of the major players are preparing for the demise of mainframe-based accounting, INPUT believes it is too early to categorically dismiss the mainframe as a viable accounting applications platform. In fact, the difficulty vendors such as Great Plains Software have had developing for a Windows-based environment caused early delays in product slipping. Also, some users remain skeptical about the value of graphical interfaces in accounting, that is fundamentally a character-based application. Large users must still rationalize the cost of moving from mainframes to networked, graphical systems.

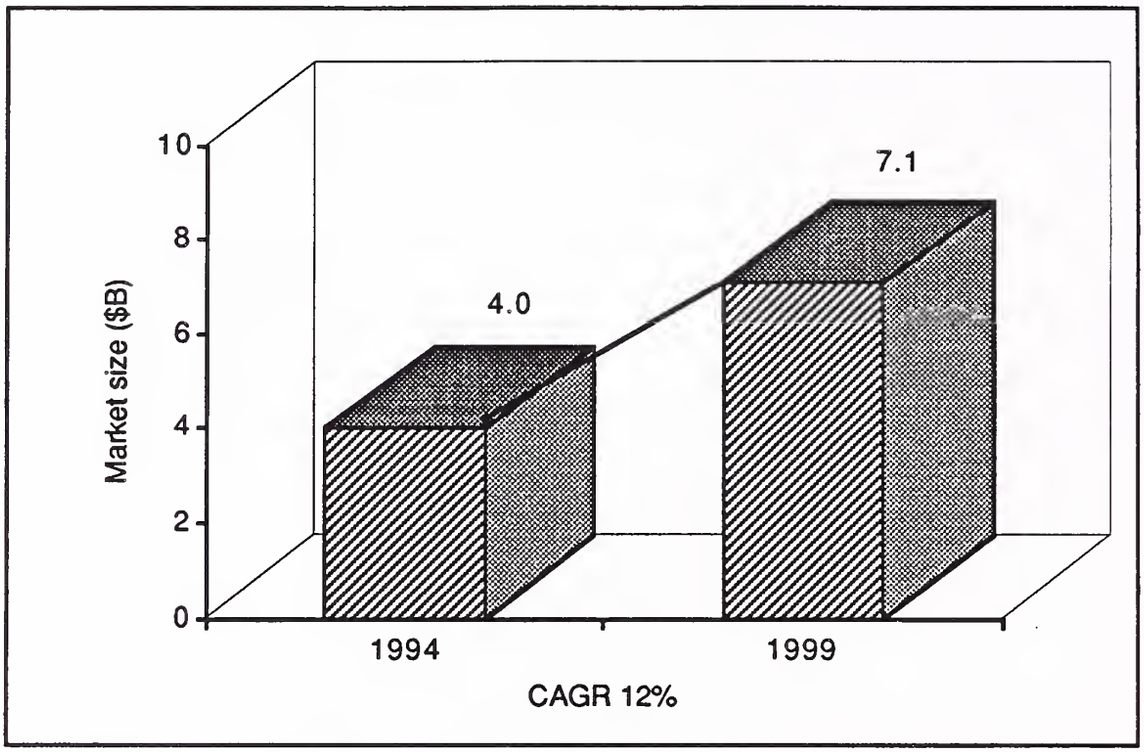
The reasons users continue to rely upon mainframe-based accounting applications have changed little since INPUT last reported on this cross-industry sector. The slow economic upturn and the realignments at IBM and Digital have made it clear that the economy and the competitive environment in which most companies exist continues to spur re-evaluation and re-engineering of business methods. Because accounting forms the core of business methods, it is still more fiscally sound for companies to indulge their mainframe appetites than to create a substantial capital outlay to migrate or downsize. The key to user and vendor success on this issue is to realize that the migration to new accounting applications solutions must be meticulous and should be approached with well-conceived migration strategies to assure revenue and benefit growth.

C
Information Services Market Forecast

INPUT has maintained its 1994 forecast from the previous year to reflect user expenditures that were on target with those predicted in 1993. The overall forecast for the accounting cross-industry sector is presented in Exhibit II-1.

EXHIBIT II-1

Accounting Cross-industry Sector Information Services Market, 1994-1999



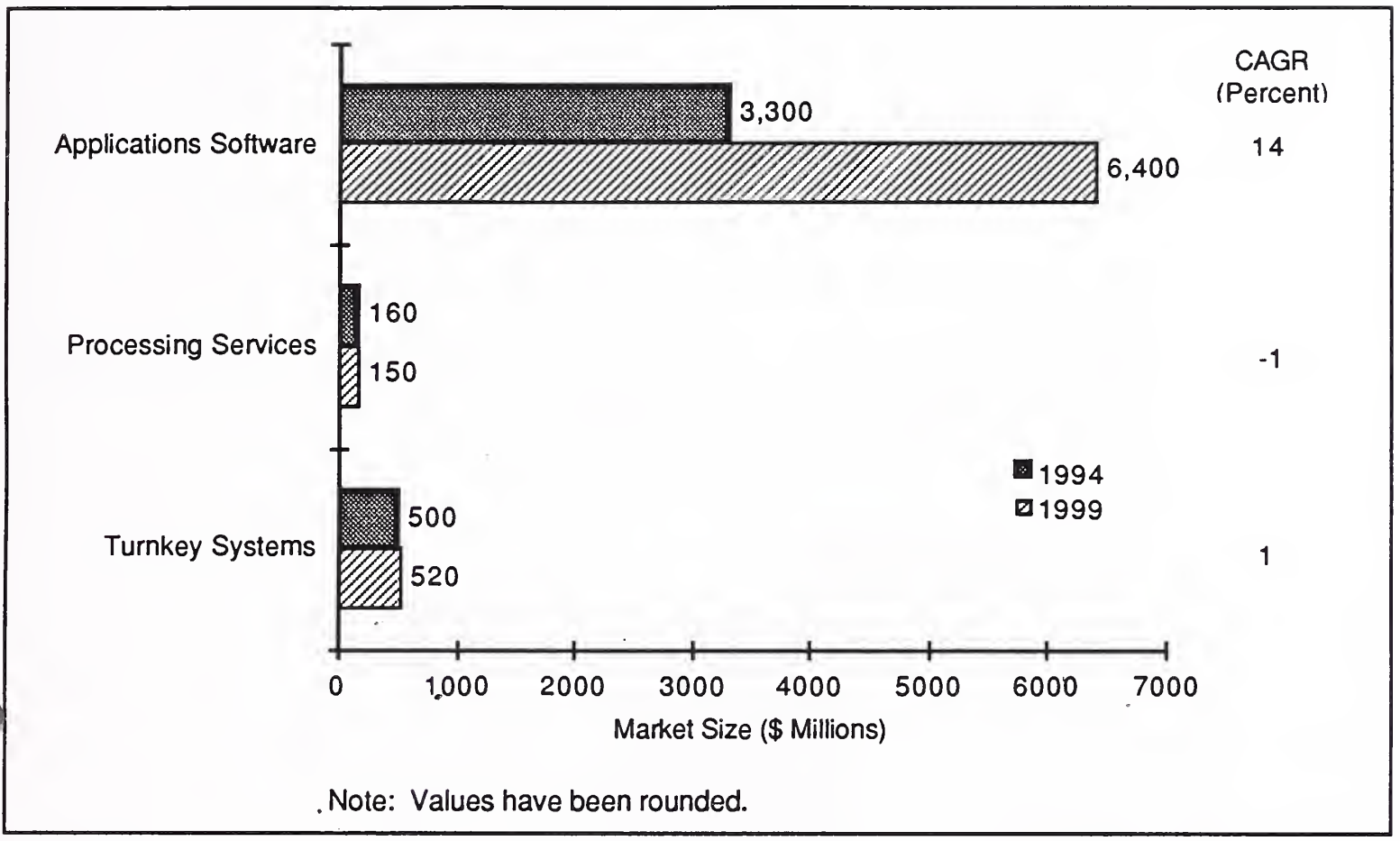
An overall reconciliation of the 1993-1998 cross-industry forecast is presented in Appendix A. A discussion of the accounting sector product/service market follows.

1. Applications Software Products

Exhibit II-2 shows the expected size of each product/service market in the accounting cross-industry sector. Of the three product/service markets in this market, applications software products is not only the largest, but will experience the healthiest growth rate over the next five years. Exhibit II-3 shows the growth expected for accounting cross-industry applications software products by platform size.

EXHIBIT II-2

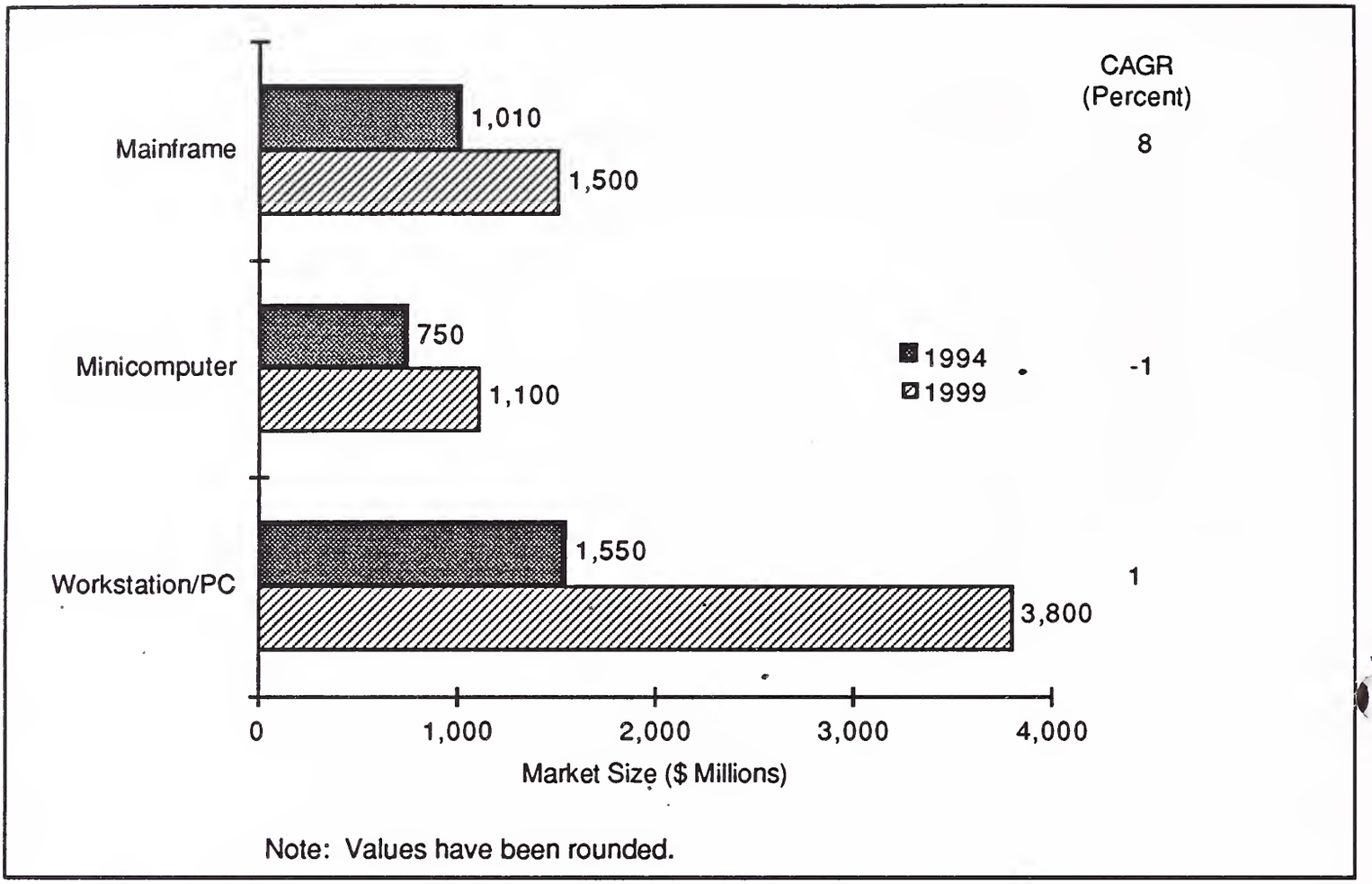
Accounting Cross-industry Sector
Information Services Market, by Product/Service Market , 1994-1999



Note: Values have been rounded.

EXHIBIT II-3

Accounting Cross-industry Sector
Applications Software Products Market by Platform Size, 1994-1999



Note: Values have been rounded.

User expenditures on mainframe-based accounting packages increasingly focus on flexibility, ease of use and client/server capability. As the forecast period progresses, users will decrease their expenditures on upgrades and increase spending on migrations and client/server products. However, mainframe applications spending will remain respectable as second- and third-tier users maintain their legacy systems, or upgrade them for incorporation into client/server networks..

As with mainframes, minicomputer-based accounting applications software products will continue to experience moderate growth. Users have made considerable investments in midrange hardware over the last five years. Consequently, these platforms are better positioned to perform within client/server configurations and eventually be further downsized.

The popular, and increasingly pragmatic, shift toward client/server and downsized architectures has made the workstation/PC segment the most

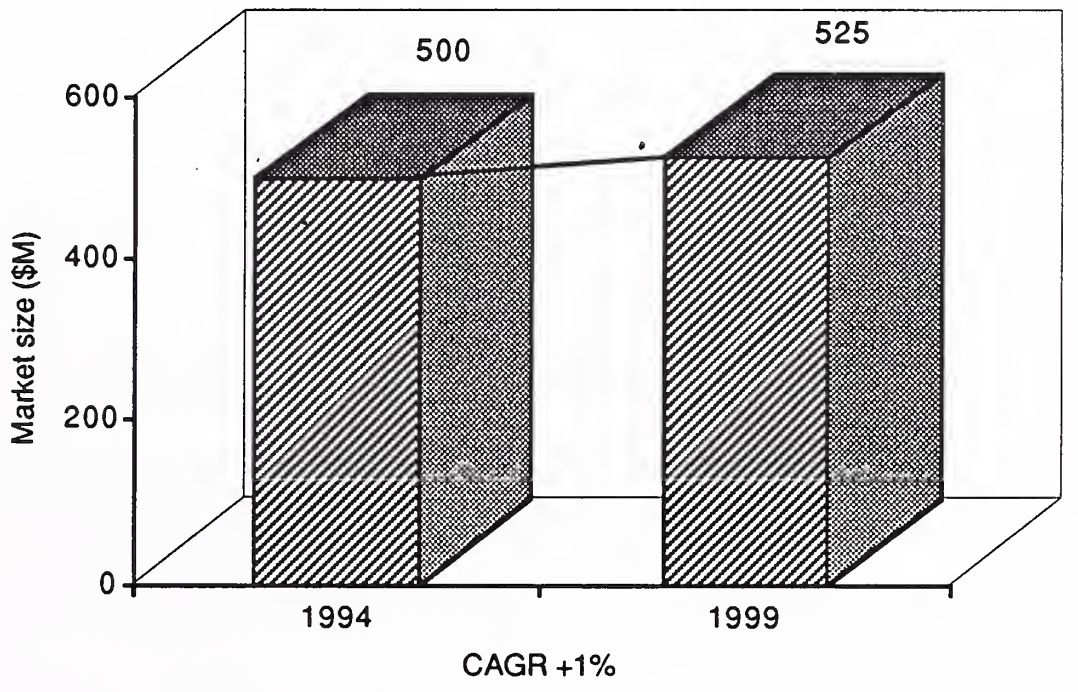
viable one for accounting applications software. As the practical differences between platforms continue to erode, INPUT forecasts the strongest growth for this segment. User preferences for Windows and comparable graphical user interface technologies have made the workstation/PC platform the technology of choice for small to midsized companies and corporate user departments that prefer the flexibility, relative economy and ease of use this platform offers.

2. Turnkey Systems

Exhibit II-4 presents the expected growth in accounting cross-industry turnkey systems.

EXHIBIT II-4

Accounting Cross-industry Sector
Turnkey Systems Market, 1994-1999



Note: Values have been rounded.

Due to research for this chapter, INPUT has revised its considerations for the accounting turnkey systems market. INPUT believes this market will show modest growth for the forecast period, instead of the modest decline reported for 1993-1998. This is due to the remaining need of many specialized industries, such as construction, forestry and agricultural for industry-specific accounting applications. In construction,

Timberline Software sells core accounting software and custom modules to address industry terms and commodities.

Turnkey vendors and VARs sell accounting systems predominantly to small and midsized businesses with annual sales of $25 million or less. For these users, turnkey vendors are still an affordable alternative to the hardware and software vendors and systems integrators used by larger companies. However, accounting turnkey systems is still small, and becoming more industry specific. Vendors and VARs in this segment often start with an existing accounting package and configure it with industry-specific operational solutions, ultimately creating an integrated solution with little cross-industry applicability.

INPUT believes the market for turnkey systems is still sizable, albeit industry specific, but the availability in the retail market or in cross-industry accounting packages and PCs is overpowering the need for the more expensive turnkey solution.

3. Processing Services

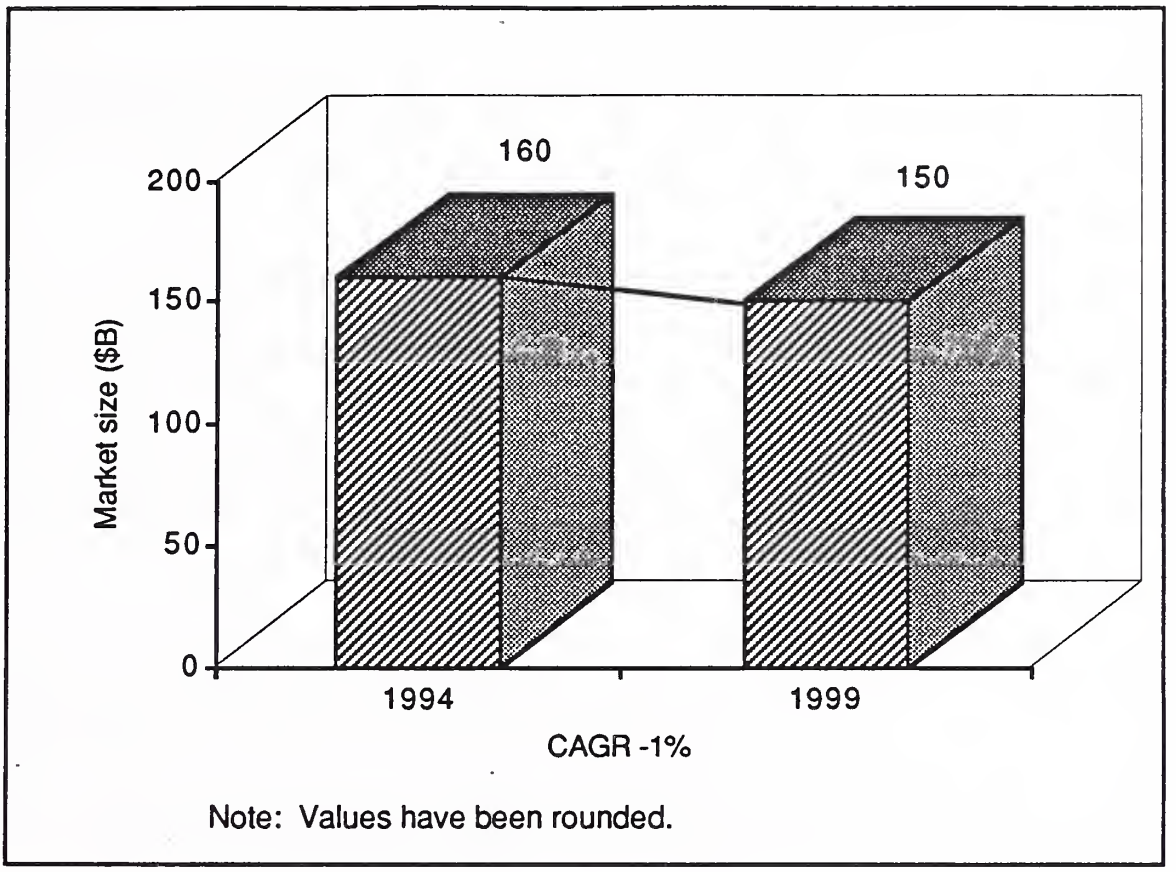
Exhibit II-5 presents the expected growth in the accounting cross-industry sector processing services market.

Accounting cross-industry processing services does not include tax processing services sold to accounting firms, nor does it include payroll processing services (which is a human resource function) or processing services that support banking and finance functions such as back-office banking, electronic funds transfer and retail point-of-sale applications.

Although a market for accounting data entry will continue to exist, it is primarily considered an industry-specific transaction processing service. In fact, no processing services firms exist today that perform all aspects of the corporate accounting function, though many firms offer parts of the function.

EXHIBIT II-5

Accounting Cross-industry Sector Processing Services Market, 1994-1999



Note: Values have been rounded.

Therefore, accounting processing services are a small and declining segment of the entire processing services industry. Accounting was among the first functions that corporations computerized and is relatively static compared to functions like payroll processing. Security concerns also make it less likely for a corporation to relinquish its operating records to an outside firm for processing services. And since packaged applications software products that run on personal computers and workstations are readily available, large and small firms can do their own accounting and related processing.

Ultimately, the only real source of new expenditures in accounting processing services is with companies that are downsizing and need some form of transition management to off-load applications that may include accounting applications software.

D
Conclusions and Recommendations

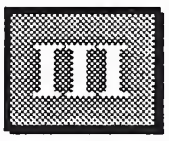
1. Conclusions

- Although accounting is a core application, it continues to be the focus for conversion to distributed environments or client/server architectures.
- However, mainframe-based accounting activity is still important and viable, even though PC-based use is growing faster and will far surpass mainframe application market size by 1998.
- There remains a need, and an opportunity, for turnkey-based accounting applications, particularly in specialized industries like construction and agriculture where terminology and inventory commodities remain industry-specific.

2. Recommendations

- Users must closely examine the cost versus benefits of migrating accounting applications to distributed or client/server environments. A migration conducted in a meticulous manner with clearly identified methods and goals, is the best way for vendors and users to achieve success.
- PC-based applications is the largest and fastest growing accounting market.
- Successful vendors in this area are, and will continue to be, those with modular, scalable products. Products of this nature give users more options and guarantee their ability to control expenses for software by making it easier for them to buy what they need as the need arises.

INPUT's overall accounting forecast shows higher growth in this sector between 1993 and 1994 than shown the previous year. This is due to the nearly explosive demand increase for PC-based applications software. As the largest single segment n accounting, PC software growth will be driven by the need for multiplatform client/server applications.



Education and Training

A
Industry Definition

As defined by INPUT, the education and training cross-industry sector consists of education and training delivered to business users as a software product, turnkey system or through processing services–courseware delivery techniques collectively described as computer-based training (CBT). Training for instructor-led businesses is not considered in this report, nor is the educational courseware used in K-12, college and university, or community education academic programs.

Instructor-led education can be provided as an information service by professional services firms, or as part of the professional services activities of systems integrators. This market is described, analyzed and quantified in INPUT's two information services product/service reports–the *U.S. Professional Services Market* and the *U.S. Systems Integration Market*. The K-12, college and university and vocational/technical school academic courseware-based education and training is considered in detail in INPUT's annual industry report on *Education*. Also considered in the Education industry report are education-related research and administrative and academic library applications.

CBT–CBT consists of authoring systems and courseware. Courseware is what the student actually sees and interacts with at a terminal, while authoring systems provide toolkits or "shells" for courseware development. CBT is not limited to training related to information systems subjects, although initially CBT concentrated on the IS technical area. Today, CBT is offered for almost any category of employee on any subject. Examples of other major application areas include training for sales and marketing, safety, health awareness and basic skills such as adult literacy. CBT training is also offered on such industrial topics as machine and mechanical technologies, industrial maintenance, diesel and automotive technology and a broad range of engineering topics.

In its 1993 *Professional Services Market* report, INPUT estimated that more than $3.5 billion would be spent in 1994 on IS-related instructor-led

education. Although larger, by an order of magnitude, than the nearly $430 million 1994 market for information services forecast in this cross-industry education and training chapter, the cross-industry market is still substantial and growing at a compound annual rate that is more than 25% higher than for the professional services market.

B
Key Trends and Issues

1. Overview

It has been noted by some statisticians that, in today and tomorrow's economic and business environment, an individual can expect to experience anywhere from three to five career changes, and hold four to 25 jobs in a lifetime. This reality has been recognized by most corporations, including one major information services vendor. In an employee newsletter, the vendor stated that in the forseeable future the corporation could no longer guarantee full-employment, but would pledge to provide a positive work experience in which the employee would gain or refine skills which would enhance the employee's marketability in the course of his or her working life. Although, at first glance, this philosophy seems harsh, it is, in fact, realistic and responsive to the realities of the U.S. working environment through at least the millennium.

The "no guarantees" admonition is applicable not only to the less well-trained or unskilled labor force, but also to all workforce classifications: executive, management, professional, technical, administrative, clerical, craftsmen and others. The message is clear–times have changed, and the full employment practices of the past are no longer possible or rational in today's labor environment of downsized workforces, productivity improvements, technology alternatives and global competition.

Businesses, however, have not lost sight of the value of a skilled, well-trained workforce, and are aggressively pursuing education and training programs for their employees–as a means of improving productivity and achieving corporate profit objectives and in recognition of the long-term need for and value of employees with enhanced skill sets in technical and non-technical areas. One technique for the cost-effective and efficient delivery of education and training courses that is growing rapidly in popularity is computer-based training (CBT), or non-instructor led training (non-ILT)–the subject of this cross-industry analysis.

CBT education and training can be segmented into two broad categories: (1) IS-related education and training and (2) other technical, business, trade and general skills education and training.

IS-Related Training and Education–The instructor-led portion of the training spectrum, delivered primarily by professional services vendors such as Andersen Consulting and Ernst & Young, will total an estimated $3.5 billion in 1994 and is included in INPUT's Professional Services product/service market category. That portion of such IT training that is delivered via CBT is included in this report.

Other Technical, Business, Trade and General Skills Education and Training–This is the "all other" category of CBT that is other than CBT-delivered IT training. Training aimed at a specific vertical market, such as training for airline flight attendants, is classified as industry-specific, and quantified in the appropriate INPUT industry report. In the case of the flight attendant example, it would be the Transportation Industry Market report. Companies such as DPEC and NETG offer courses in general business skills in addition to IT-specific courses and CD-ROM-based courseware, such as The Software Toolworks' *Mavis Beacon Teaches Typing!,* are very popular for business and personal use.

2. Factors Affecting Growth

There are a number of key factors driving the growth of cross-industry CBT-based education and training. They include:

Lower Training Costs–Although not all courseware lends itself to independent study that can be delivered in a CBT mode, generally it offers lower training expense due to savings in instructor and travel costs, and a reduction in lost employee time due to education and training activities.

Workforce Changes–The nature of the U.S. workforce is changing. The change started in the late 1980s and is accelerating as a growing concern for social programs such as adult literacy. Increasing job displacements due to downsizing and business profitability concerns drive the need for improved basic skills training and individual retaining to pursue new career paths.

Enhanced business and personal skills such as typing, mathematics and composition are needed for many workers to move to new jobs as old ones are eliminated or require skills beyond current capabilities. Skilled professionals who have lost jobs to industry upheavals, such as those in the defense and aerospace industries, must redirect their talents into new industries and need help in acquiring the general skills which will allow them to follow new career paths. CBT offers a ubiquitous, cost

effective means of accomplishing such training, either on the job or at home using personal PCs and appropriate applications software.

Technology–The growth of CBT is, in part, related to the growth in the population of workstations and PCs. Although CBT can occur in a concentrated "learning center" environment, one of its key advantages is that such training can be delivered directly to the student/employee at their desk or in their office via remotely managed processing services, standalone software packages, dedicated turnkey systems or client/server distributed courseware. In most cases, declining software and hardware costs resulting from technological improvements are making such delivery vehicles more cost-effective.

Perhaps the most exciting of the new technologies for education and training is multimedia, a technique heavily facilitated by the use of CD-ROMs. This technology will be discussed in greater detail in the following section on Trends.

3. Key Trends

The following are the significant trends in the use of cross-industry education and training for American industry.

Growing Use of CD-ROMS–At first, CD-ROMs were simply a sophisticated vehicle for interactive software (mostly games) and an excellent way of storing and retrieving audio, visual and text information from large volumes of data. Now, these same attributes have also been refined into a virtuoso medium for training and education. Consider the *Mavis Beacon Teaches Typing!* course. The student not only follows instructions and performs drills presented on the CRT screen, but also takes verbal dictation to measure touch-typing skills. Other examples include CD-ROM atlases that play national anthems and CD-ROM encyclopedias that include film clips of famous 20th Century speeches.

The market for multimedia courseware will continue to grow as the quantity of available courseware increases, but the most significant growth spurt will occur as more and more major software vendors start distributing code and supporting text exclusively on CD-ROM. Companies such as Microsoft have already indicated their intent to eventually use the CD-ROM as their primary (and probably, in some cases, exclusive) distribution vehicle. The reasons are simple: lower vendor cost and an improved information transfer to the user.

CD-ROMs now incorporate on-line manuals and other reference materials (that can be continually updated just prior to distribution) and also offer tutorials with audio and visual segments detailing product use. The user benefits from imbedded multimedia training modules and access

to rapid, context-sensitive or keyword searches on-line. There are now CD-ROMs that encourage users to educate themselves, such as those addressing multimedia use offered by Doceo Publishing (*Video Sampler*), Individual Software, Inc. (*Professor Multimedia*), and Jasmine Multimedia Publishing (*How to Create Multimedia*).

Lotus Development Corporation's Lotus Consulting Services Group, in conjunction with CBT Systems of San Francisco, has developed a 10 course 90-hour computer-based training package for Lotus Notes called *CBT for Notes*. This Windows-based package allows users to select topics of interest rather than rigorously proceed through the complete lesson set.

Need to Reduce Education and Training Costs–Although the need for and benefits of education and training are generally recognized and accepted by the business community, costs remain an issue. CBT offers a cost-sensitive alternative that delivers many of the required benefits while eliminating instructor and travel costs and optimizing the use of student time. Where CBT courseware alternatives are available and meet user needs, there is a strong potential for significant cost-containment.

Use of Multimedia–Multimedia, by its very nature, offers an efficient training vehicle that comes closest to replicating real-world situations where all the senses can be involved. For this reason, it lends itself to use in nontechnical areas, where the opportunity to offer visual and audio clues or stimuli can enhance the learning process. For instance:

- Holiday Inn Worldwide has developed a multimedia application package for employee training that simulates hotel operations. The program runs on an IBM PS/2 system and includes sound effects and actors playing various roles.

- NationsBank uses an interactive visual presentation to educate staff and customers on the complexities of import/export factoring, one of its major application areas. This non-CD-ROM application runs on 80386 computers with 4 MB of RAM and uses animation and photographs.

- 3M and Carolina Power & Light are using a variety of computer-assisted training packages to educate IS personnel.

- Bell Atlantic's Performance Enhancement Organization is using CBT-based training systems from CBT Systems USA, Ltd., to provide training in data communications, client/server computing, programming languages and a number of other IS-related topics for management and non-management employees. This student-paced approach uses the full range of CBT Systems' library of courseware, so that training can occur when and where required and reference materials are readily available.

Multimedia provides the means to improve simulation- and stimulation-based instruction. Programs with a purpose, incorporating a well-designed simulation of the task to be learned, video clips to stimulate visual response and functional attributes that allow user-control of the learning process are the next generation of CBT-based leaning tools. For a steadily growing number of these courseware offerings, the multimedia delivery vehicle will be a CD-ROM.

Structured Approach to Education and Training–A growing number of companies are recognizing the need for different types of training for IS and non-IS subjects, and the need for a structured approach to education and training as opposed to letting each user department do their "own thing." Such a structured approach recognizes the value of ILT and CBT and defines what type of training will be used to satisfy specific needs. More and more training is being offered as CBT courseware libraries (such as that offered by CBT Systems) proliferate.

Improved Use of Organizational Technology Investments–There is increased recognition that the use of CBT helps an enterprise realize increased return on its technology investment. One company estimates that using in-house multimedia CBT training saves $4 in travel costs for every training dollar spent. This savings does not include the more efficient use of the employee's time.

Lack of computer literacy in a large portion of the workforce is a limiting factor in realizing the potential benefits from technology investments, but CBT courseware aimed at improving such literacy is already in use at many firms.

Vendor Unbundling–The trend of charging for (or paying for) only what the client needs is reducing or eliminating free technical support, including education and training, from many vendors. Users now have to either pay extra for such services or provide it themselves. CBT frequently offers the most cost-effective education and training solution, with courses suited to the time, location and educational needs of individual employees.

4. Key Issues

Significant issues concerning the use of cross-industry education and training resources include the following:

Nonmultimedia Installed Systems–Although there is general agreement that where CBT is used, multimedia is the most effective delivery vehicle, there is also a growing recognition that implementing multimedia can have hidden costs. CD-ROM delivery of multimedia courseware requires a CD-ROM reader, and for effective interaction with the student, the unit should run at least at the double-spin (higher transfer rate) speed. For those companies wishing to deliver education and training to employees at their desk, this means that either internal or external CD-ROM drives, video cards, sound cards and speakers are required for installed or new systems. At an average cost of $300 to $500 per PC, this is not a trivial expense.

Another area of concern resulting from the growing family of sophisticated training software using the latest PC technology, is the need for CRTs that can display high resolution graphics (e.g. super VGA, noninterlaced, with vertical refresh rates in the 70 MHz range), and internal data transfer schemes using local bus architecture so that system speeds can keep up with program demands. Performance standards generally dictate RAM sizes of 8K or more, and PC i486 processor speeds at 33 MHz or greater. Each of these system requirements also is a cost factor if installed PCs are not already configured to these standards.

Companies using a centralized, "learning center" approach to education and training need only concern themselves with the costs at the educational facility. Those wishing to provide training at local workstations and PCs must consider upgrade or new system costs for those requiring training that do not have appropriate equipment installed.

Network or client/server distribution of some courseware can minimize CD-ROM requirements, but LAN, WAN or MAN performance must then be taken into consideration, and there is still the need to have adequate display (CRT) and systems performance. This problem will diminish in the coming years as more systems are installed with CD-ROM capability, in recognition of the growing trend in the use of this medium for software and documentation distribution.

User Preferences for Help *Support*–A pragmatic near-term limit on the use of CBT for education and training is the preference of many users, some at high levels in a company, to call a *Help Desk* (or similar function) for assistance with IS-related problems, rather than acquiring the skills to deal with them directly. Such skills would include effective use of on-

line references or user manuals. This limitation, however, can be overcome by such positive reinforcement techniques as an effective corporate campaign stressing user independence and the value placed upon IS-related skill sets.

Continuing Education: Who's Responsible?–As noted in the *Overview* to this section, there is a constant need for employees to update old skills and learn new ones in order to stay competitive in the labor force, make effective use of new technology, and help a company achieve its business objectives. To satisfy the majority of these needs, the answer is education and training. A question for many firms (and individuals) however, is who is responsible for the educational process?

The old adage, "You can lead a horse to water, but you can't make him drink," applies equally well to education. A corporation can offer a wide range of company-sponsored training courses, but if the employee does not accept responsibility for making effective use of such resources, their value (and the return on the investment in them) will be diminished. For instance, many companies believe that education and training should not always have to be conducted on company time, although it will generally be conducted on the company premises.

With the changing nature of the employer/employee relationship in the business environment of the late 1990s, employees can be expected to take advantage of corporate training opportunities and become active advocates of and participants in the education and training process. The question of responsibility will disappear as parties to education and training (provider and user) take active roles in the process.

Guidelines for CBT Programs–There is some concern that CBT programs tend to emphasize the learning vehicle rather than the content of the courseware–that there is more "flash" in the presentation than substance in the content. Most companies, however, are becoming more sophisticated in their ability to judge the attributes (presentation and content) of CBT and other education and training alternatives. Although the more popular authoring languages for CBT development offer a variety of tools or resources for presentation development, the content is the responsibility of the author. Guidelines for program development tend to relate more to the learning environment–platform selection, portability, performance and presentation (the four Ps)–rather than content that will vary from topic to topic, and by educational technique or philosophy.

For most users, the concern will be first for the content, then for applications that use their own installed or planned PC/IS resources. Vendors will have the same platform interests, although they will also

seek to expand the presentation resource for better courseware delivery and competitive advantage.

C
Market Forecast

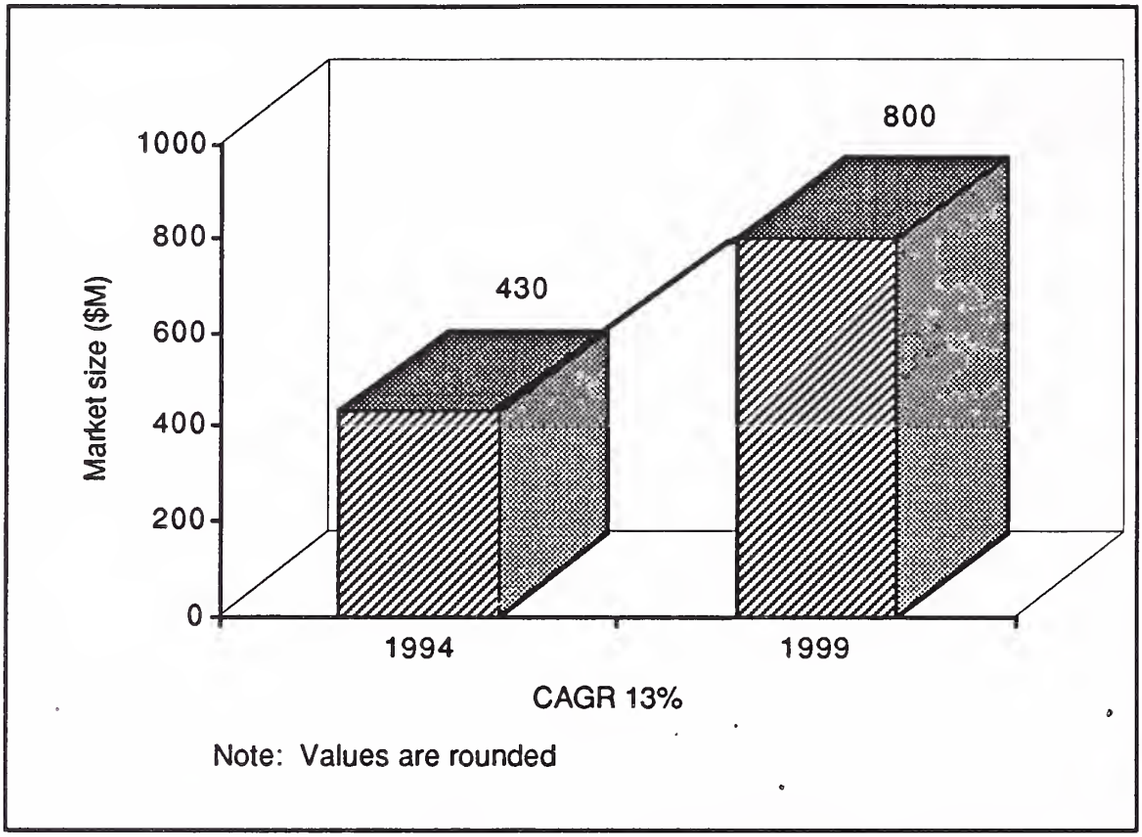
1. Market Overview

Total information services expenditures for the U.S. cross-industry education and training market grew to $391 million in 1993–$11 million (and 3%) more than the amount forecast in the 1993-1998 MAP report. As can be seen in the forecast reconciliation section of this report, reasons for this growth included: the increased availability of CBT courseware; the growing popularity of CD-ROM-based multimedia-enabled education and training software; a return to moderate, controlled economic growth; and an increased awareness in the public and private sectors of a need for and the value of job training and job-displacement retraining.

INPUT has sized the 1994 information services segment of the education and training cross-industry market at slightly more than $430 million in 1994, and expects growth through 1999 at a 13% compound annual growth rate (CAGR) to $800 million. This growth is diagrammed in Exhibit III-1. The 13% overall five-year CAGR for 1994-1999 is up three percentage points from the 10% forecast in 1993 for the period 1993-1998. The increase is due to the factors noted in the paragraph above.

Exhibit III-1

Education and Training Cross-industry Sector Information Services Market, 1994-1999

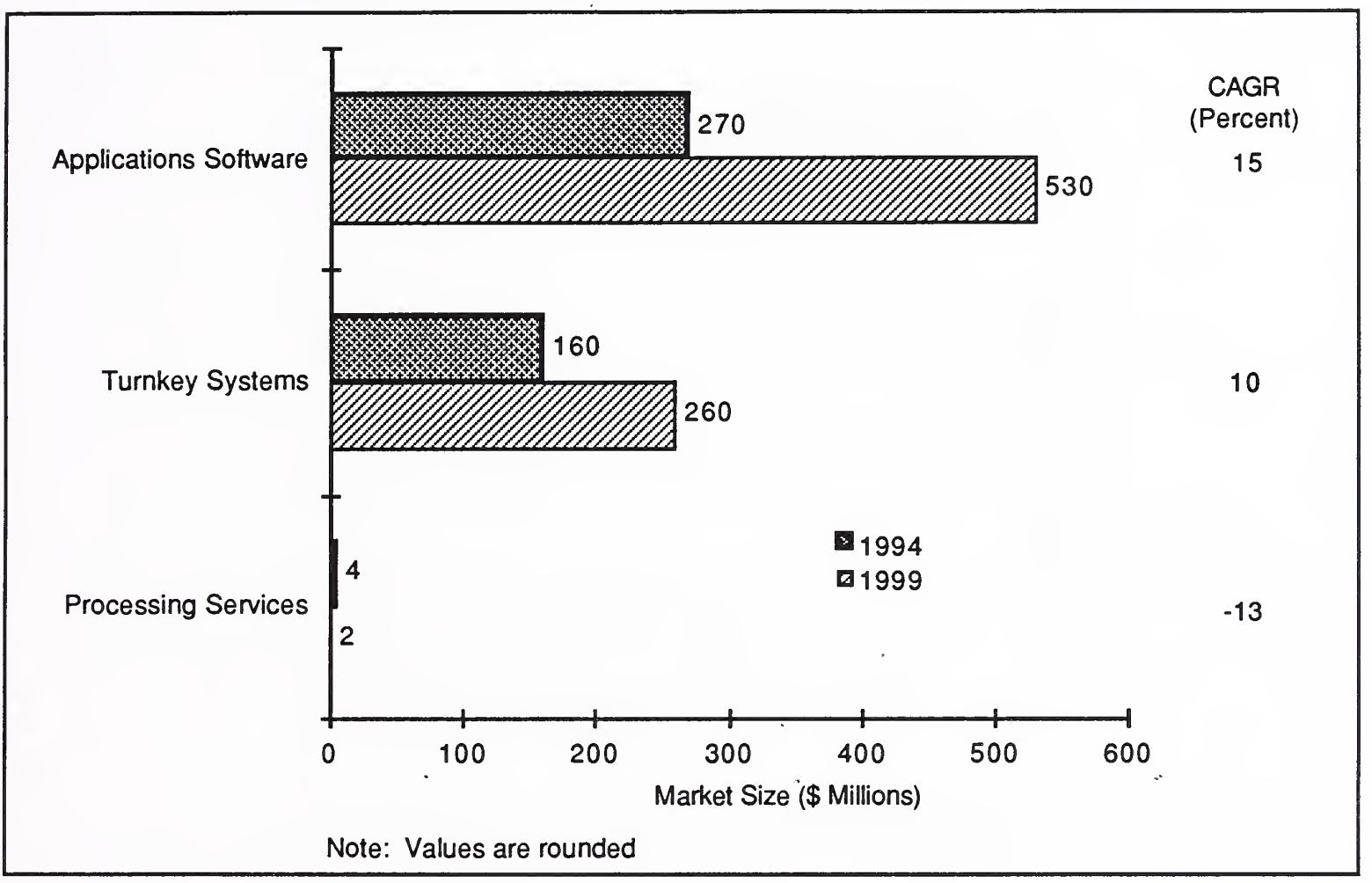


2. Product/Service Market Sectors

The 1994-1999 forecast of market size by product/service market sector in the cross-industry education and training market is shown in Exhibit III-2. Analyses of the various product/service markets follow the exhibit.

Exhibit III-2

Education and Training Cross-industry Sector Information Services Market by Product/Service Sector, 1994-1999

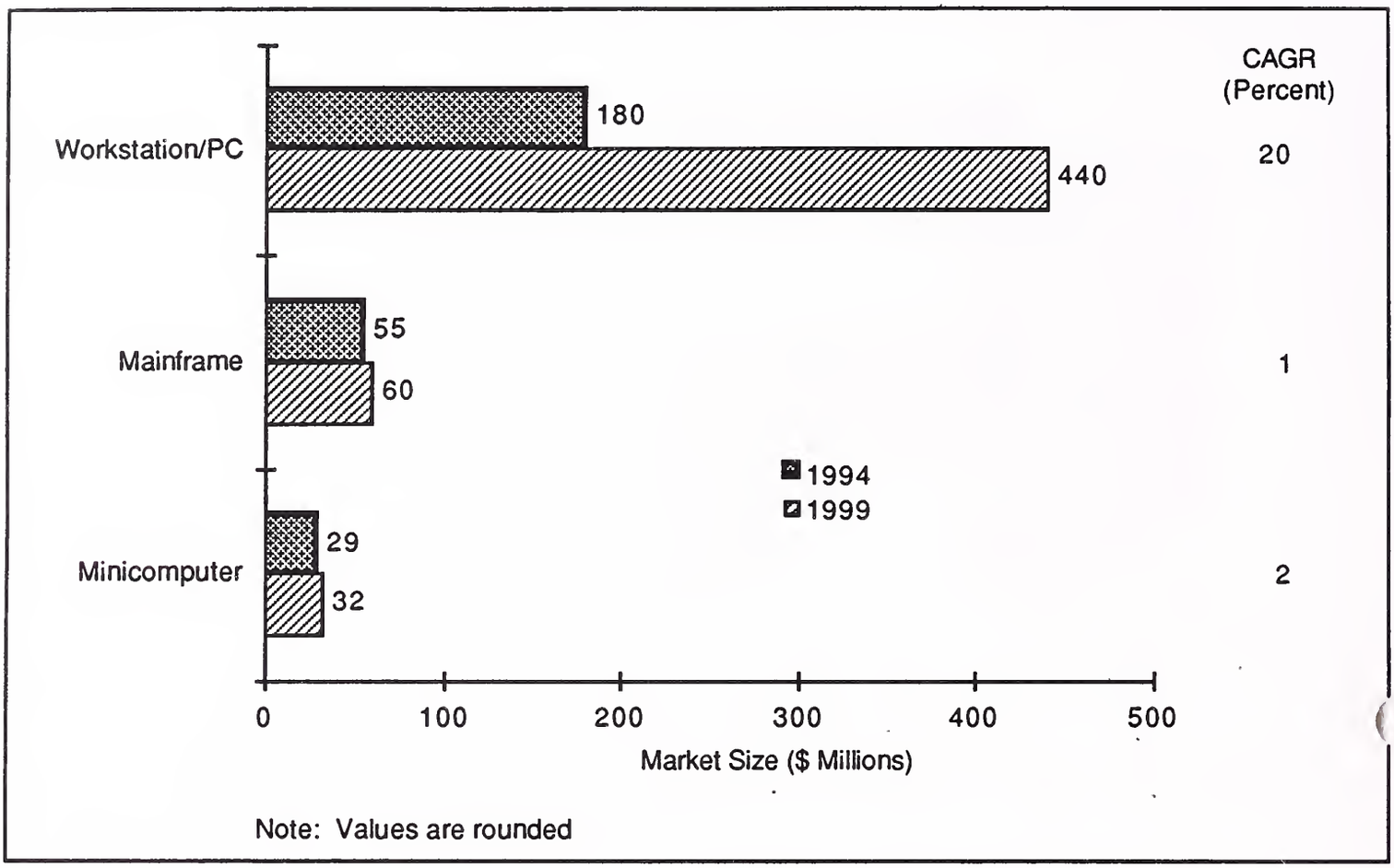


Note: Values are rounded

Applications Software–Driven by a growing appreciation of the value of well-designed, well-presented, CD-ROM-based, multimedia education and training courseware, the application software market will grow at a strong 15% CAGR through 1999, from almost $270 million to more than $530 million over the five-year period. As noted in Exhibit III-3, this growth will be fueled almost exclusively by the growth in workstation/PC-based courseware. Authoring systems for platform-independent education and training applications will also contribute to this growth.

Exhibit III-3

Education and Training Cross-industry Sector Applications Software Products Market by Platform Size, 1994-1999



Note: Values are rounded

In almost all training situations, the use of PCs or LAN-based workstations will continue to be more convenient and less costly than providing terminals connected to general-purpose mainframes or minicomputers. As a result, mainframe and minicomputer application software growth will be minimal, at a 1% and 2% rate, respectively. This small growth, however, reflects the fact that some users will continue to prefer a centralized education and training resource, either for ease of administrative control or as a result of a strong enterprise bias toward centralized processing. As more time passes, however, and the independent or LAN-based population of PCs with multimedia capability grows, the size of the mainframe and minicomputer market will start to diminish, and growth will turn negative, as it has with processing services.

Much of the new courseware will take advantage of multimedia presentation attributes, and old noninteractive courseware is being rewritten or upgraded to include audio and visual capabilities and repackaged for CD-ROM delivery. Although applications versions for

users without multimedia or CD-ROM capability will continue to be offered, the most significant enhancements can be expected in the multimedia environment–a technology uniquely suited to education and training applications.

Turnkey Systems–Growth in this product/service sector will be from more than $160 million in 1994 to $260 million in 1999–a five-year CAGR of 10%. Turnkey solutions, like LAN-based PCs, are a popular training alternative, since complete systems can be offered which incorporate CD-ROMs, video disks and other equipment to provide a complete, stand-alone education and training resource. For instance, a turnkey solution might allow CD-ROM courseware to be delivered without requiring separate CD-ROM readers at each terminal.

In general, turnkey systems for most business applications are more likely to be purchased by small firms rather than large ones, but education and training systems tend to be used by firms of all sizes.

Paralleling the use of turnkey systems in other industries and application areas, the most significant five-year growth (13%) will be in the use of professional services supporting the system. Software product growth will be at 11%–a result of the expanding library of new and revised courseware and education and training applications. Equipment growth will be at 8%, constrained by the decreasing cost of hardware.

Processing Services–The use of processing services, with their pay-as-you-go usage-sensitive cost basis, will continue a slow but steady decline, from $4 million in 1994 to only $2 million in 1999. This market has been severely impacted by the growing capabilities of standalone and networked PCs, with their lower connection costs and expanding libraries of education and training courseware.

Ceridian's (previously Control Data) early entry in this market, PLATO, offered thousands of hours of college-accredited courseware, delivered to plasma terminals with touch-sensitive screens by huge centralized processors. In the late 1970s and early 1980s, it was hoped that such a resource would revolutionize all types of business-related computer-based education and training and open broad new markets for K-12 and college-level educational alternatives. But delivery costs were high–typically beyond the reach of schools and universities with limited funds, and the only markets able to justify the cost of such training were commercial, such as the use of PLATO for pilot instrument training and NYSE broker training and certification testing. Control Data eventually sold its PLATO division, and no serious general purpose contender has ever again entered this market. Those considering the need to offer such education and training services now choose the more cost-effective,

functionally rich applications software or turnkey system delivery alternatives.

D
Conclusions and Recommendations

This section summarizes INPUT's conclusions regarding the education and training cross-industry marketplace and offers recommendations regarding competitive strategies and courses of action for users and vendors of education and training information services products.

1. Conclusions

The following are INPUT's conclusions regarding the education and training marketplace and the information services products sold to this cross-industry market segment.

- Education and training for employees is a practical solution to contemporary business needs and a socially responsible corporate activity. These conditions can be expected to continue for the balance of this decade.

- Given the estimates of the number of career changes the average worker can expect in years to come, company-sponsored education and training programs are now and will continue to be a major corporate tool for facilitating career and workforce changes. The availability of such programs will be viewed as highly desirable benefits by labor unions, professionals, clerical staff and other members of the labor force.

- Although some topics do not lend themselves to CBT delivery techniques, those that can be moved to CBT or take advantage of the CBT presentation alternative will migrate to that environment because of the significant cost savings inherent in using an installed platform base (workstation/PC) and the potential savings in instructor costs, travel expenses and lost work time.

- The education and training platforms of choice will be workstations and PCs (using a variety of architectures and operating environments) simply because they are ubiquitous and cost-effective. Workstations and PCs will be either standalone units or networked as part of client/server implementations.

- Although many IS departments are being downsized as such groups decentralize to user and departmental staffs, IS-related education and training will be even more important for users, so they can assume a more active role in the management of their own resources.

- Multimedia is the most effective delivery vehicle for CBT. At present, costs are high, but they will come down, especially as more PCs are sold with CD-ROMs to accommodate applications software and documentation distribution preferences.

- CD-ROMs will be the education and training multimedia delivery vehicles of the future. Forget about the incremental costs of the CD drive and associated video and sound drivers. There is simply no better alternative technology at this time.

- Centralized corporate education and training departments will continue to identify training resources and pay the cost of such training. The employee, however, still has the ultimate responsibility to take advantage of the resources offered and effectively apply the knowledge or skills gained.

- The greatest vendor opportunities lie in providing education and training application software, in terms of absolute market size and long-term growth rate. The most ubiquitous platform will be the workstation/PC, and the most popular courseware delivery vehicle will be multimedia programs on CD-ROMs.

2. Recommendations

INPUT offers the following recommendations to vendors and users.

- Users:

  - *Facilitate Change*–Recognize the economic trends and realities that are now becoming visible and prepare your employees for change by helping them enhance their skill sets through well-defined, well-thought-out corporate-sponsored education and training programs.

  - *Leverage Existing Investments*–CBT offers the potential for very cost-effective leveraging of workstation/PC investments made for other business purposes. Use instructor-led training where appropriate, but optimize the CBT alternatives.

- *Quantify* All *the Costs*–Consider and quantify CBT technology requirements when considering the costs of implementing CBT. Include the appropriate CD-ROM, sound board, sound driver, speaker, video accelerator, high-resolution video monitor, processor speeds and other costs necessary to take advantage of sophisticated multimedia courseware. These resources are easier to install and cheaper to buy when they are ordered with a new system.

- *Stress the Value of Education*–Treat education and training as a valuable corporate resource and promote it that way–especially basic skills training which might lack the panache of advanced engineering or programming courses.

- *Use Vendors to Your Own Advantage*–Favor those with integrated libraries of courseware available for immediate off-the-shelf use. Although unique company-specific courseware can be written, it will be expensive. Determine if standard, already-available programs are a better investment.

• Vendors

- *Multimedia is Key*–Although more costly to develop at this time, INPUT believes that multimedia is the key to the future for cross-industry computer-based education and training. Concentrate efforts on multimedia courseware development, a technique which educators are now starting to describe as "educating the whole brain."

- *CD-ROMs Are The Way to Go*–The CD-ROM is a cheap, effective way of delivering multimedia courseware, large databases, applications software and reference material such as manuals and user guides. In time, INPUT believes that CD-ROMs will become the distribution vehicle of preference, and those vendors who master the use of such a delivery mechanism will have a competitive edge in the near term.

- *"Flash" versus Substance*–Avoid the temptation to overemphasize "flash" in the presentation of education and training courseware. Use sophisticated multimedia sound, graphics and visuals for emphasis where they offer the best presentation technique, but always concentrate first on content and topic substance.

- *Application Suites*–Where possible and practical, develop an integrated suite of education and training applications software that can be marketed as a package–a total solution to a definable subset of educational needs, such as basic business skills, literacy or computer programming. Such packaging enhances the opportunity for initial and add-on courseware sales and demonstrates the vendor's comprehensive ability to address educational needs.

- *There Is Still Time to Be A Major Player*–Although some topics and types of instruction will always be best delivered via instructor-led training and education, there is a growing belief that almost anything that can be taught can be effectively delivered via CBT, especially when multimedia techniques are used. It is still early in the application of CBT to business and society's education and training needs. Now is the time for vendors to think "big" and not limit themselves to small markets. Niches are fine and offer an entry point and an anchor, but vendors should consider expanding their market presence *now*, while there is still plenty of room for growth.

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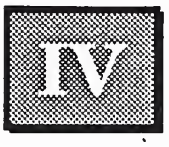


Engineering and Scientific

A Industry Definition

The engineering and scientific cross-industry sector encompasses the following applications:

- Computer-aided design and engineering (CAD and CAE)
- Structural analysis
- Statistics/mathematics/operations research
- Geographic information systems/Mapping

CAD and CAE–Only nonindustry-specific CAD and CAE activities are considered in this report. Computer-aided manufacturing (CAM) or CAD that is integrated with CAM is excluded from this document, since it is specific to the discrete and process manufacturing industries. CAD or CAE that is dedicated to integrated circuit design is also excluded because it is specific to the electronics industry.

Structural Analysis–Structural analysis (or finite element analysis) helps engineers in a number of industries analyze the structural integrity and thermal adequacies of components. A relatively new and developing market is electromagnetic field analysis, which analyzes the interaction between electrical fields. Examples of applications are:

- Fuselage and wing internal load analysis (Aerospace)
- Bumper impact analysis (Automotive)
- Dynamic and static load analysis (Construction)
- Gearbox and transfer case stress analysis (Industrial machinery and mechanical design)

Statistics/Mathematics/Operations Research–Statistical and mathematical analysis applications encompass all forms of sample and

survey analysis for market research and product testing, including such diverse applications as personnel evaluation, decision support, health care analysis, computer performance evaluation and operations research. Specific examples include:

- Reviewing/analyzing data from accident reports (insurance)
- Evaluating air traffic controller information (transportation)
- Census data collection (federal government and others)
- Monitoring of student performance, class selection, and education testing (education)

GIS and Mapping–Geographic information systems (GISs) and desktop mapping capabilities are finding a broad range of applications. GISs and mapping software capture, manage, analyze and display geographic information. Traditional uses include environmental monitoring, site planning and natural resource management. Utility and transportation firms are using GISs for facilities planning and management tasks, and government agencies are using GISs to manage public resources. Examples of commercial applications include demographic market analysis to help retailers decide where to locate new stores, tax assessment programs for municipalities, and emergency vehicle routing for rapid response to critical situations.

The concept and implementation of desktop mapping is a recent development, brought about not only by the proliferation of computer power at the desktop, but also by the increasing availability of geographic databases and the ability to provide street maps.

B
Key Trends and Issues

1. Overview

Traditionally, engineering and scientific programs of any size and complexity have demanded larger processors–usually mainframes. These engines have typically been used for the complex designs or scientific analyses required by larger businesses that have the need to perform complex designs and analyses and the means to pay for the resources required. The advent of powerful PCs (such as Intel's 486 DX family and the Macintosh high-end processors), however, has placed effective scientific and engineering tools in the hands of virtually anyone with a need for such resources. Complex, sophisticated design and scientific analysis activity is still performed on mainframes and minicomputers, but

smaller, more contained tasks have been steadily migrating to PCs. With the advent of the even higher levels of processing power available from new engines such as Intel's Pentium chip and the new IBM/Apple/Motorola PowerPC processors, more and more engineering and scientific applications will be offered for PC- or workstation-based platforms.

As INPUT has stated for the last few years, the engineering and scientific operating environment is changing. More tools and products are PC-based, have PC options available, or can be used in a client/server environment. As a result, engineering and scientific activity, as a functional cross-industry capability, is becoming a cost-effective resource available to users at more and at lower levels of business activity.

2. Key Trends

The following are the key trends driving the engineering and scientific cross-industry market, including specific consideration of technology and applications trends.

Platforms–The growth in the population of workstation/PCs in the business environment continues to be ballistic. Much of this growth is the result of the continuing drop in prices for PCs which, in turn, has resulted from a continuing reduction in processor chip prices. This has been particularly noticeable in early 1994, as Intel's shipments of Pentium processors has increased, driving down prices for its 486 and 386 chips. Apple's recently announced PowerPC chips are causing a drop in the price of PCs powered by the time-honored Motorola 68000 chip. IBM initially will use the new PowerPC chips in its RS/6000 workstations that run AIX.

IBM is serious about using the PowerPC processor–serious enough to give up its license to manufacture Pentium processors and marry Kaleida's Malibu multimedia chip to the PowerPC–thus signaling its intent to offer a high-performance low-cost IBM multimedia system in the $2,500-3,000 range. Price trends for PCs with the power to drive most planning applications, such as those noted above, are making effective engineering and scientific tools available to almost any user.

The availability of such effective, low-cost resources continues to have an effect on the growth of other platform alternatives. Mainframe population growth is expected to continue, but at a declining rate and significantly below that of PC/workstations. The growth of minicomputers (generally IBM AS/400s) as platforms for engineering and scientific applications has been relatively stable, and INPUT expects the population of such platforms to continue to be essentially flat (no growth) over the next five years.

Downsizing and Decentralization–Re-engineering, outsourcing, downsizing and decentralizing–these are the shorthand terms for change in the 1990s. As the U.S. economy gets stronger and businesses emerge from the recent extended economic slowdown, many are reassessing their resources, markets, products, goals, objectives and ways of doing business. In many cases, businesses are re-engineering not only the way they do business (*not* a scientific and engineering activity), but also the products they produce. Firms of all sizes are positioning themselves and their products to take advantage of the emerging global marketplace–a shifting competitive environment–and make better use of the many new technological tools available to them.

Downsizing and decentralization are also causing more and more companies to push engineering and scientific computing resources, and the responsibility for contracting for information services, further down in the organization–in some cases directly to the scientist or engineer end-user. The users, in turn, look for cost-effective, reliable, supported, scalable applications that can be easily installed and easily maintained. In many cases, their first consideration is shrink-wrapped PC applications software.

GUIs–The growing popularity and population of graphic user interfaces (GUIs), such as Microsoft's *Windows*, *Windows NT* and *Windows for Work Groups*, are improving the quality and ease of use of PC-based engineering and scientific applications. High-resolution monitors, icons, and easy-to-use graphics packages facilitate design and analysis process and improve the quality of the end product.

Networks–LANs, WANs and Metropolitan-Area Networks (MANs) and now the *Internet* and the *Information Superhighway* are becoming an integral part of the corporate communications environment and, thus, are becoming increasingly available to users for engineering and scientific activities. Networks are useful for gathering data from distributed sources; they are also the information conduit between clients and servers in a client/server environment.

Client/Server–Considering client/server architecture and invoking client/server applications is a hot technology topic for most businesses. In a recent INPUT survey of major U.S. businesses, more than 50% of the new or enhanced applications planned by these companies for the next three years are to be implemented using client/server architecture. No other technology identified even approached that level of interest, or that confirmation of value. It is clear that client/server architecture is here to stay, and that many engineering and scientific applications will be candidates for this production environment.

Technology Trends–There are a number of key technologies, established and emerging, that will influence the cross-industry engineering and scientific marketplace during the forecast period. Although noted in other contexts above, the importance of these technologies to the engineering and scientific cross-industry is repeated here, for emphasis. The key technologies are:

- *PC/Workstations*–The proliferation of these desktop resources will place efficient, high-performance engines for engineering and scientific applications at the lowest levels of design and analysis activity. Matching this growth in microcomputer platforms is the increasing availability of sophisticated, low-cost, pre-packaged applications software for these platforms.

- *Client/Server*–This architecture is growing in popularity and is well-matched to the needs of the new, decentralized business environment.

- *Graphic User Interface*–The GUIs are revolutionizing user applications interfaces and the ease with which reports and charts are produced. Since so much of the engineering and scientific process is driven by a visual analysis or representation of calculated results, the increased availability of GUI-based applications will have a strong positive impact on this cross-industry market.

- *Networks*–The use of networks tailored to the needs of the enterprise is facilitating the movement of information within a company's infrastructure. This ease of exchange, in turn, is helping the design, planning and research processes by making more current information easily available to scientists, engineers, researchers and other technical staff.

Applications Trends–This section summarizes significant applications trends in the areas of CAD and CAE; structural analysis; statistics, mathematics, and operations research; and geographic information systems (GIS) and mapping.

- *CAD and CAE*–Traditionally, most CPU-intensive CAD/CAE work has been done on UNIX workstations with 64-bit paths, on minicomputers or on mainframes. Intel's Pentium processor, with its 64-bit architecture, and less expensive workstations with more power, offers a new, cost-effective resource for CAD/CAE applications.

These new platforms can effectively run many computer-aided design and engineering software tools. An inevitable result of this availability of power will be the migration of more processing resources closer to the user. This, in turn, will stimulate a related migration to the workstation/PC environment of many applications which previously were only available on mainframes or minicomputers.

Concurrent engineering, which allows a number of engineers to work simultaneously on multiple phases of a product's design and engineering, will become more common as the more powerful workstation/PCs proliferate. By taking advantage of the new micro-platform's 64-bit architecture, multiprocessing systems will be able to cost-effectively perform many CAE applications in tandem rather than as sequential tasks.

Object database technology is another area that is adding functionality and performance to CAD/CAE applications. By removing functionality from the program and embedding it in the objects in object-oriented database management systems (ODBMS), the code which must be resident in the application can be reduced by as much as a factor of five. This, in turn, allows for better program performance and more and faster design iterations.

- *Structural Analysis*–As with CAD/CAE, structural analysis applications are benefiting from the growing availability of more powerful workstation/PCs in the workplace. Although 32-bit processors have been capable of handling many structural analysis applications, analyses of greater complexity or with larger data arrays will perform much better in a 64-bit environment.

  Many structural analysis applications using graphical representation with complex information handling, retrieval, recognition and interpretation capabilities that once required the 64-bit power of a super computer, will now be able to be processed on a 64-bit microcomputer. With 64-bit workstations and PCs, a viable, cost-effective alternative to mainframes exists, and INPUT expects to see more and more sophisticated structural analysis applications offered on micro-based platforms.

- *Statistics/Mathematics/Operations Research*–No matter what the industry or product, statistical analysis, mathematical routines and operations research (OR) techniques and evaluation will be useful tools and generally function without industry- or product-unique modifications. As with CAD, CAE and structural analysis, the availability of powerful, new workstation/PC platforms provides the opportunity to migrate many of the more sophisticated mathematical analyses from larger minicomputers and mainframes to smaller platforms in the hands of the user.

  In many cases, mainframe application architecture and design does not have to change dramatically (if at all), since the smaller platforms have memory size and processor speeds equivalent to that of many mainframes.

- *Geographic Information Systems/Mapping*–Mapping is no longer simple cartography. It is least-cost routing for shipments, trip planning for vacationers, territory planning for sales managers, property tax boundaries for municipalities and demographic representation and analysis for governments at all levels–local, state and federal.

  Because of the size of the databases typically used to analyze geographic data, most geographic information systems (GISs) have run on mainframes, and it is only with the proliferation of powerful PCs that such applications have been able to move to a smaller platform. Large government and commercial applications will almost certainly continue to use mainframes, while newer, more popular consumer and small business applications will use PCs.

  The majority of new GIS applications are being written for microcomputers, and most offer map-related databases and sophisticated information manipulation and display capabilities, including the creative use of color.

  GIS is useful for more than just mapping. Utility companies use GIS to maintain information for service areas, telecommunications firms manage data related to land-lines and wireless (cellular) on GIS, government agencies use it for environmental studies and long-range planning, and the commercial sector is developing many uses, including inventory management and demographic analysis.

  Marrying geographic information systems (GIS) to global positioning systems (GPS) will eventually let every business know where key assets are at any time, and every traveler knows where *he* or *she* is at any time. As INPUT noted in last year's report, the pieces are all in place. It is only a matter of time.

3. Key Issues

Because of the basic nature of the functions performed in the engineering and scientific cross-industry market, it tends to be less issue-oriented than most other cross-industry or vertical industry markets tracked by INPUT. Whereas other markets typically have a number of topics or issues upon which opponents have strongly differing positions or opinions, the engineering and scientific market is inclined to see rational alternatives, each with pros and cons, to which due consideration should be given.

There are three significant issues, from an information services viewpoint. They are the continuing viability of CAD and CAE as a distinct cross-industry market, the suitability and cost-effectiveness of various platforms for engineering and scientific applications, and the potential for geographic information systems. Each of these issues is discussed below.

The Cross-Industry CAD/CAE Market–Computer-aided design and engineering products are used in virtually all manufacturing industries. As generic design and engineering tools become more accepted by, and hence more useful to, an industry such as aerospace or automotive or small electronics, there is a vendor tendency to refine them and either make them industry-specific or offer industry-specific versions of the original generic product. When this occurs, the design or engineering tool is no longer a cross-industry resource; it is a useful, industry-specific design or engineering tool–and is now counted by INPUT as an applications software product used by the specific industry.

As new software design and engineering tools are developed, they will frequently be offered first in generic versions, then refined, based upon usage experience, to meet the specific needs of the largest industry markets. The effect of this product cycle is to limit the size of the generic cross-industry engineering and scientific tool market, since the most dynamic growth will occur via industry-specific product variations. Vendors are not overly concerned with this growth pattern, since they will sell products into generic and industry-specific markets. The overall market size and growth numbers in this section of the report and in Appendix A reflect this market pattern.

Platforms–INPUT maintains that most of the growth to occur in the engineering and scientific cross-industry market will be driven by the availability of the smaller, more powerful workstation/PC platforms using high-end processors such as Intel's Pentium systems and the new family of PowerPC engines. These small, powerful platforms will offer users a new processing alternative designed to meet their personal computation and analysis needs, and vendors will have an expanding market in which to sell existing or improved products. The net effect will be continued

growth in this market, fueled by the growth in the use of more powerful workstations/PCs. The new families of low-cost Intel DX2 and DX4 (clock-multiplied) processors will also extend the performance (and life) of the 486 chips by offering internal, cache-enhanced cycles in the 60 to 100 MHz range–powerful enough for many scientific and engineering applications.

Many scientific and engineering applications will continue to run on large mainframes and minicomputers for the foreseeable future. They either have processing requirements or data manipulation needs so massive that no other platforms are viable. In some cases, time (or job turnaround) limitations also mandate the larger platform requirement.

Geographic Information Systems (GIS)–This is not so much an issue as it is a conundrum. Just what *is* the potential for GIS? The original concept of GIS was to offer a way of defining, analyzing and basing conclusions of geography-related data. The early output from such systems tended to be tabular rather than graphic, and was primarily used by those with a technical orientation to perform such tasks as plotting power lines (utilities), managing natural resources (petroleum firms) and tracking pollutants (manufacturers). But "techies" are no longer the only ones using GIS–retailers are also now developing a strong interest in its capabilities.

At the June 1994 GIS conference in San Francisco, a growing number of retailers indicated that they are seeing dramatic increases in sales and a corresponding reduction in cost of sales as a result of using GIS to target and qualify specific prospects for their products. Isuzu Motors, for instance, used special mapping software to identify households in Pasco, Washington, with incomes greater than $50,000. A special marketing program then resulted in sales in one month that matched the total sales for the prior six months. Isuzu also contended that the use of GIS was a significant factor in trimming recent marketing and distribution costs by more than 21%. Performances such as Isuzus are not lost on other retailers who also wish to improve sales and profits. For many of these firms, the use of GIS will contribute significantly to these objectives.

The concept is simple. Marry the appropriate demographic database to an easy to use and understand graphic interface (GUI), and identify those most likely to buy your product. Watch sales increase, cost of sales drop and profits go up. And best of all, buy this product for $100 to $1000 and run it on your PC. What American businessman could resist this concept? Not many, INPUT believes, and as more businessmen successfully apply GIS techniques to marketing, others will have to follow or lose market share. When the tool is ubiquitous, however, growth will taper off, but usage should remain high through the millennium, until a better tool becomes available.

C
Market Forecast

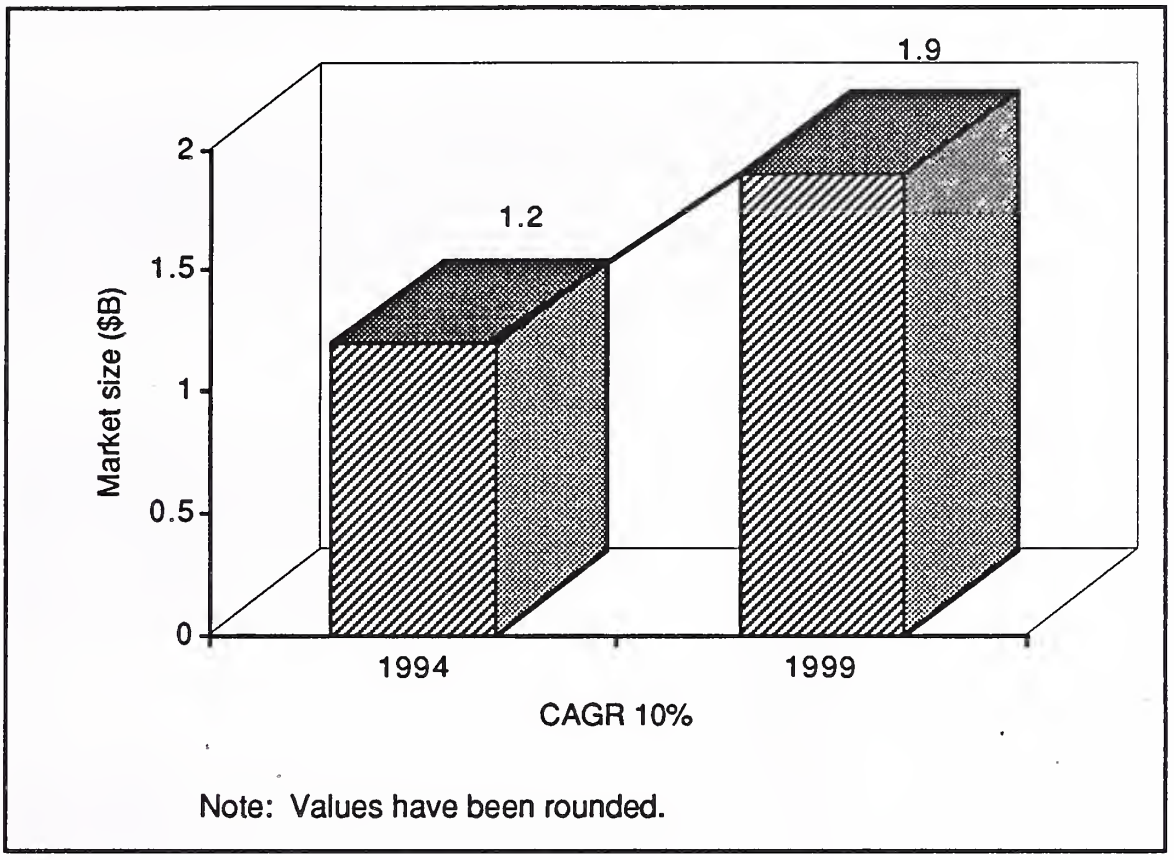
1. Market Overview

Total information services expenditures for the U.S. cross-industry engineering and scientific market grew to almost $1.1 billion in 1993–$3 million more than the amount forecast in the 1993-1998 MAP report. The slight (less than 0.5%) variation between the 1993 forecast and actual values was due to continued growth in the workstation/PC portion of the applications software market segment.

INPUT has sized the 1994 information services segment of the engineering and scientific cross-industry market at slightly less than $1.2 billion in 1994, and expects growth through 1999 at a 10% CAGR to almost $2 billion. This growth is diagrammed in Exhibit IV-1. The 10% overall five-year CAGR for 1994-1999 is at the same level as that forecast in 1993 for the period 1993-1998. There is a slight change, however, in where that growth is occurring, as will be noted in the following section.

Exhibit IV-1

Engineering and Scientific Cross-industry Sector Information Services Market, 1994-1999



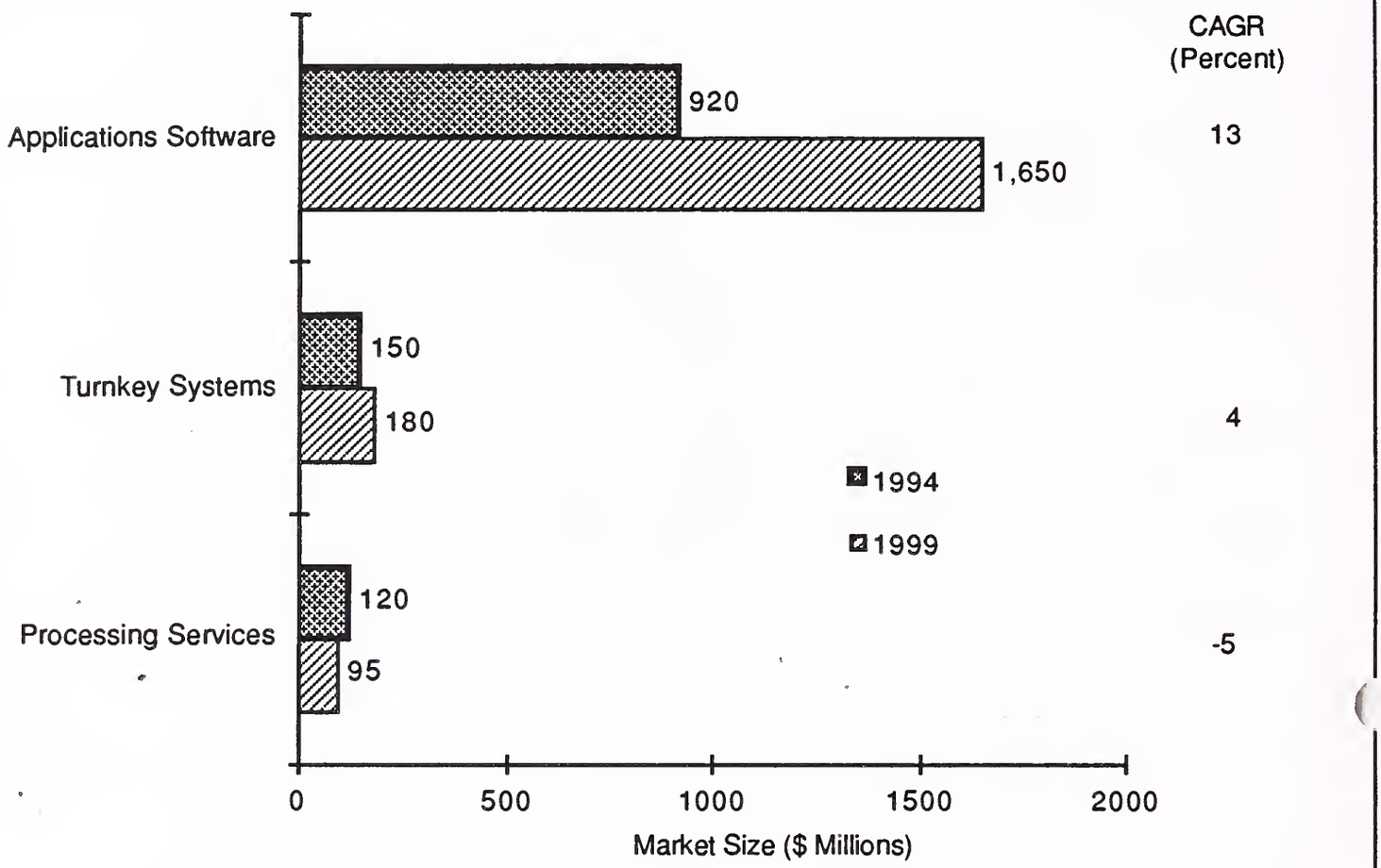
Note: Values have been rounded.

2. Product/Service Market Sectors

The 1994-1999 forecast of market size by product/service market sector in the cross-industry engineering and scientific market is shown in Exhibit IV-2. Analyses of the various product/service markets follow the exhibit.

Exhibit IV-2

Engineering and Scientific Cross-industry Sector Information Services Market by Product/Service Sector, 1994-1999

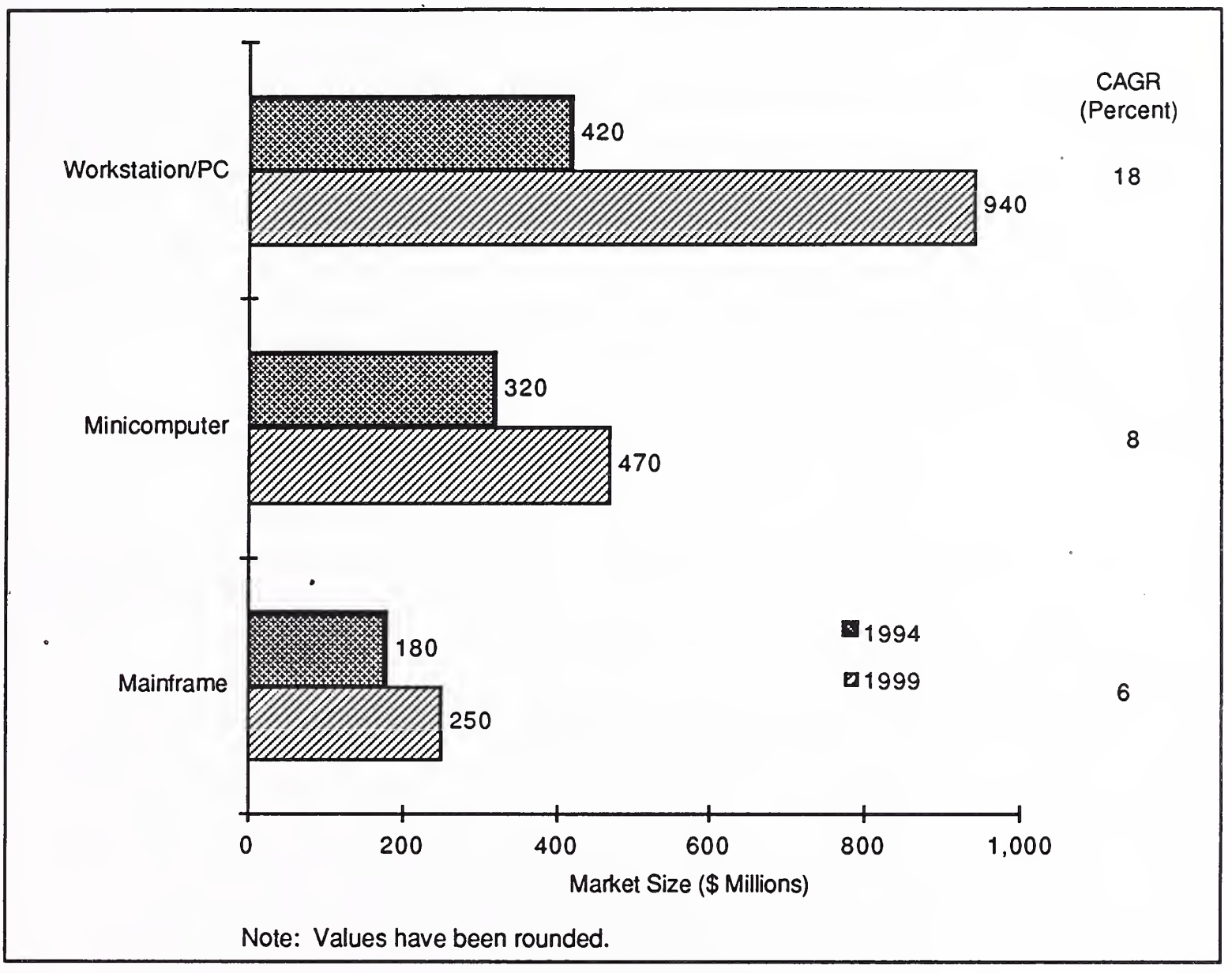


Note: Values have been rounded.

Applications Software–The strongest growth in the engineering and scientific cross-industry market will occur in the area of applications software. This growth is fueled by the continuing migration of computer-intensive applications from the traditional mainframe or dedicated minicomputer environment, to the growing families of high-performing high-end workstation/PC platforms. As noted in Exhibit IV-2, the 1994 market for applications software is $920 million, growing to $1.65 billion in 1999–a five-year CAGR of 13%. Exhibit IV-3 shows where, by platform, the growth is occurring.

Exhibit IV-3

Engineering and Scientific Cross-industry Sector Applications Software Products Market by Platform Size, 1994-1999



Note: Values have been rounded.

From this exhibit, it is clear to see that computer-intensive applications, given a low-cost, high-performance alternative, are migrating to smaller platforms–specifically to the workstation/PC platform–where user expenditures are expected to grow at an aggressive 18% CAGR through 1999, from almost $420 million in 1994 to nearly $940 million in 1999. The growth rate for applications on this platform has been raised a percentage point from last year's forecast, but INPUT believes that if GIS software sales start to grow in the consumer and retail markets, even the 18% growth rate may be too conservative.

The mainframe and minicomputer applications software market growth rates have been dropped a percentage point for this year's forecast. The

growth in the population of Sun, Digital, Hewlett Packard, MIPs and other Reduced Instruction Set Computing (RISC) processors as well as the new PowerPC-driven RISC micros and Pentium-based PCs, have presented an alternative too attractive to ignore.

Many expenditures that might have gone to mainframe- or mini-based applications are now being directed toward products for the smaller platforms. This trend does not mean that, in time, there will no longer be scientific or engineering applications on mainframes and minicomputers. It simply means that there is a viable alternative for those applications that can be benefitted. Applications requiring significant computer resources, large file manipulation, or other attributes not compatible with a micro environment will continue to reside on larger platforms and there will continue to be moderate growth in expenditures for applications software products for these platforms.

Turnkey Systems–Growth in this product/service sector will be from almost $150 million in 1994 to nearly $180 million in 1999–a CAGR of 4%.

Although the majority of the turnkey systems (including VARs) in this industry are for CAD and CAE applications, some GIS turnkey solutions are also available. As with all other product/service markets in this cross-industry market sector, growth tends to be limited due to most businesses' tendency to require industry-specific functionality.

The original CAD vendors addressing this cross-industry market sector offered turnkey systems, providing what were, at the time, specialized engineering workstations and applications software solutions. The trend now is to not tie applications products to a single platform, and offer applications scalability and portability to meet a wide range of user needs, while minimizing requirements for changes in function or format. Limited turnkey system growth is still available from sales of such platforms to smaller companies or to departmental users within larger companies. In the long run, however, if the trend toward faster and cheaper workstation/PCs continues, more and more new applications will be implemented on the smaller platform, thus further increasing the size of the workstation/PC market at the expense of the other platforms.

Processing Services–INPUT estimates the 1994 engineering and scientific market for transaction processing services at $124 million, down 4% from the 1993 expenditures of $129 million. There will be a continuing decline in the size of this market–averaging -5% per year–to $94 million by 1999.

The downward trend in transaction processing expenditures is directly related to the growth in expenditures for applications software and turnkey systems, and the shift of more and more production to these environments and away from traditional processing services. In pre-

workstation/PC days, transaction processing services such as time-sharing or remote batch offered the scientist or engineer a computing resource that was more responsive to needs than many in-house data processing departments. In addition, costs were proportionate to use, response (job turnaround) was negotiable (for a fee), and the vendor frequently provided sophisticated applications software not easily accessed or obtained elsewhere.

The growing population of high-performance (relatively) low-cost workstations and PCs, however, and the growing availability of engineering and scientific application software for these platforms, has had a dramatic effect on the processing services sector. Over the past few years, more and more users have off-loaded their transaction processing applications to in-house micros, mainframes, or minicomputers. The advent of more client/server applications, coupling PC clients to larger platforms (servers) will continue this slow but steady migration.

D
Conclusions and Recommendations

This section summarizes INPUT's conclusions regarding the engineering and scientific cross-industry marketplace and offers recommendations regarding competitive strategies and courses of action for users and vendors of engineering and scientific information services products.

1. Conclusions

Steady Growth–Growth rates by specific application and application subset will vary widely, but overall, the use of CAD, CAE, structural analysis, and mathematical and statistical routines and operations research techniques is increasing with the resurgence of growth in American business. The 10% overall growth rate for this cross-industry area reflects the importance of these applications areas and their fundamental value to engineering and scientific activities.

GIS Growth–Geographic information systems (GIS) are expanding at a more rapid rate than other engineering and scientific application areas by growing existing markets and identifying new ones for GIS. For instance, domestic applications are being expanded to include global modules (you can now buy PC software with street maps and automobile routing programs for most of the world's major cities), and new applications of GIS capabilities are emerging in the retail sales industry (targeted mailings based upon demographic data analyzed using GIS software and specialized databases). INPUT believes that this segment of

the engineering and scientific activity will continue to experience the strongest growth in this cross-industry market.

Platform Shift Continues–The migration of applications from larger to smaller platforms is continuing, driven by the ever-increasing population of powerful, functional, cost-effective workstation and PC platforms such as those systems using Pentium, PowerPC, and other high-performance RISC processors offered by Hewlett Packard, Digital, Sun, MIPS and others. Many applications are offered in scalable versions to suit the user's processor of choice, and some run in DOS and Windows operating environments, while others use UNIX. Although many applications, by choice or by necessity, will continue to run on mainframes and minicomputers, the number and variety of low-end platform options is increasing (and can be expected to continue to increase) dramatically.

The Affects of Downsizing–While downsizing is clearly a motivator to push applications downward in the IT/enterprise hierarchy, INPUT believes that cost, control, and functionality will be stronger influences on the movement of cross-industry engineering and scientific processing away from the mainframe and centralized IT functions and nearer to departmental or users.

Pictures ARE *Worth a Thousand Words*–Formulas and mathematical routines and subroutines are best viewed as text. Engineering design models, maps, and statistical data in graphic form are most meaningful as pictures–e.g. in graphic form. Fortunately, processor power, screen resolution, application software and GUI programming ingenuity are all combining to facilitate the use of pictures, graphs, charts, and other visual means of presenting complex concepts in a clear and concise manner. Although engineering and scientific applications are not clear candidates to employ multimedia technology, the growing use of CD-ROMs by vendors for software and reference material distribution will guarantee availability of this resource when applications needs require its use.

Client/Server–Although not a technical requirement for most scientific and engineering applications, the growing trends of cooperative and concurrent design (to facilitate coordination of independent elements of complex design activities and shorten development time) and the use of object-oriented databases favors client/server architecture. Coordination, performance and distribution benefits will encourage more developers to design engineering and scientific applications, especially CAD/CAE, for the client/server environment and within the next five years, most popular applications will offer that capability as a platform option.

2. Recommendations

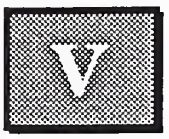
INPUT offers the following recommendations to vendors and users.

- Users:
  - *Workstation/PC Costs*–The price of standalone micros, and their performance characteristics improve almost daily. Use these devices as cost-effective solutions where usage needs dictate, but do not ignore mainframe and minicomputer options that may offer attributes beyond workstation/PC capabilities. As capabilities increase, so do requirements–especially for CAD/CAE applications.
  - *Client/Server Options*–For many application areas and industries, this environment is the wave of the future. Identify your enterprise's client/server plan (if any) and if it offers an opportunity for the effective use and control of engineering and scientific applications and activities, become part of the planning and implementation process. Identify vendors who offer client/server platform/architecture options and evaluate their solutions for your needs.
  - *Cooperative/Concurrent Design*–Consider the benefits of this approach to CAD/CAE activities, and if it is compatible with your needs, invoke it using a client/server environment. Consider future growth needs and choose a platform accordingly.
  - *Geographic Information Systems (GIS)*–Whatever your business, consider if GIS can help you to better deliver your products, target your prospects or run your enterprise. Coupling colorful graphics and sophisticated demographic databases to increase sales and reduce costs has been successful for others. Can you use it?
- Vendors:
  - *Applications Software*–Workstation/PCs are the distributed platform of the future. Modify existing application software to use this popular and cost-effective platform, and develop new applications to run on the more power PCs. If you do not already offer them, plan to provide users with scalable software options that can run on multiple platforms. If you do not already offer a client/server delivery option, consider doing so, since this architecture is rapidly becoming the processing environment of choice for the majority of businesses.

- *Marketing*–As has been true for some time now, the IT department is no longer the primary source of orders for information services products and support services. Cultivate the users who now control many of the IT budget dollars, learn who makes the decisions and what their needs are. Satisfy them.

- *Processing Services Vendors*–Your market is getting smaller, but it is still in the $100 million range. Develop compatible turnkey or application software options and determine how to migrate your users to the new production environment, as their needs dictate. If you do not offer a clear migration path, you run the risk of losing customers to other processing options that do not have usage-sensitive pricing.

- *Geographic Information Systems (GIS)*–This is clearly an area of significant growth, the potential for which is just now beginning to be understood. Do you have products that can serve this growing GIS market? Could you develop them or apply GIS principles, techniques and interfaces to existing products–including those not necessarily in the engineering and scientific marketplace? If you decide you cannot or will not play in this market, make this a considered conclusion reached by aggressively examining your business interests, capabilities and plans. Do not default to non-participation by ignoring GIS.



Human Resources

A
Industry Definition

Sector Definition - The human resources cross-industry sector, as defined by INPUT, consists of applications software products, turnkey systems and processing services purchased by multiple industry sectors to serve the functions of human resources management and payroll. Examples of specific applications within these two major functions are:

- HR Information Systems
- Applicant Tracking
- EEO/Affirmative Action Administration
- Benefits Administration
- Compensation Planning and Administration
- Human Resources Planning
- Position Tracking
- Labor/Employee Relations
- Health and Safety
- Training and Management Development
- Organizational Development
- Payroll Processing
- Attendance/Timekeeping

B
Key Trends And issues

1. Overview

The human resource/payroll systems marketplace continues to experience rapid technological and structural change. Systems and software vendors, information systems (IS) professionals and users are continuing to embrace and take full advantage of the evolving technology.

At the same time, continued dramatic changes in the corporate business climate and government regulatory environment have led to a strong continuing demand from systems users for more integrated products with greater functionality, flexibility, ease-of-use and cost-benefit. This is particularly true in the human resource benefits administration and reporting areas where much emphasis is placed on the national effort to gain some measure of control over spiraling costs of employee benefits programs.

The rapidly evolving marketplace for human resource systems has led to significant changes in the vendor community over the past two years. There has been a noticeable maturing of the marketplace. Significant vendor consolidations have taken place in almost all segments of the human resource systems marketplace as a result of acquisitions by major players. For large scale, comprehensive human resource/payroll systems, this consolidation has resulted in fewer primary vendor choices for customers. Introduction of new or revamped products taking advantage of client/server, graphical user interface is a driving force for most of the existing vendors regardless of whether they are mainframe, midrange or PC-based.

2. Major Cross-industry Sector Trends

The most significant overall trends in human resources and information services are shown in Exhibit V-1.

Exhibit V-1

Human Resources Cross-industry Sector—Industry Trends

- Vendor consolidation
- Software product acceptance
- Automation prompted by re-engineering and corporate downsizing
- Continuing government regulation and recordkeeping requirements
- Need for rapid access to critical personnel data
- Globalization of work forces

- Vendor-provided products are strongly preferred to in-house human resource/payroll system development in most environments.

- Corporate downsizing and restructuring has put pressure on human resource departments' ability to deliver services to clients. As companies scale back their middle management ranks and less staff is available to handle human resource-related matters, more emphasis is being placed on automation of human resource record-keeping and reporting.

- "Re-engineering" of the human resource function to increase efficiency and effectiveness of operations with less staff is now a popular theme.

- New government laws and regulations, particularly impending health care reform, will impact human resource/payroll system record keeping and reporting requirements very dramatically in the next year to year-and-a-half. Large and small organizations in all segments of American business will have to focus resources and attention on bringing corporate human resources practices and policies into compliance with the new laws and regulations. For many companies, this will mean substantial revisions and modifications to their human resource and payroll systems.

- The human resource function has grown in importance and visibility as corporations struggle to cope successfully with changing workforce demographics, increasing recruitment difficulties for highly skilled workers, worker training, productivity and quality improvement efforts, and of particular significance, health care and benefit-cost containment. The critical need for management access to timely and accurate data on all aspects of the corporate workforce for planning, analysis and forecasting of business plans and activities, has propelled human resource systems into a more important role in most organizations.

- The globalization of corporate work forces poses new challenges for human resource and payroll operations. The growth in the number of U.S. companies involved in international activities will undoubtedly continue to increase and bring with it new and unique human resource recordkeeping, tracking and reporting requirements. The early 1994 passage of the NAFTA Agreement has accentuated these information systems needs.

3. Technology Trends

Trends in the human resource/payroll system area clearly cut across all industry sectors. The significance of the industry trends, noted below and summarized in Exhibit V-2, are affected to one extent or another by the size of the company.

Exhibit V-2

Human Resources Cross-industry Sector
Key Technology Trends

- Client/server architecture
- Downsizing
- Networking
- Applications integration
- GUI
- Database technology
- Open systems/UNIX
- Imaging

Client/Server Architecture–This is by far the most significant driving force in the human resources (HR) systems marketplace today. All major vendors are bringing some form of client/server to the marketplace. Although client/server has proven to be more expensive and complicated than many users first realized–it remains a major market phenomenon.

Downsizing–The trend toward downsizing of the mainframe and off-loading applications to midrange or networked systems is continuing unabated from last year. For larger operations, wider availability of viable client/server-based products will likely accelerate off-loading in the human resource/payroll systems area. However, large corporations with mainframe-based payroll systems will likely want to continue to keep the payroll on the mainframe.

Networking–Due to the independence and control that a local-area network (LAN) provides users, human resource operations continue to migrate to this option as a preferred automation alternative.

Applications Integration–The proliferation of standalone or networked PC-based human resource/payroll applications has resulted in serious data redundancy and integrity problems as well as duplication of effort issues in many organizations. There is an increasing desire to have fully integrated software so that HR, payroll, and subsystems share the same master file current and historical data.

GUI–Another strong trend is toward graphical user interfaces for human resource/payroll systems. The appeal is undeniable, as shown by the success and positive press received by PeopleSoft's GUI products. All the major vendors are developing GUI products in conjunction with their client/server offerings.

Database Technology–Systems using true relational database technology continue to have strong appeal to human resource operations that have to frequently modify their databases to keep pace with constant organizational and government-mandated changes.

Open Systems/UNIX–From a technical standpoint, portability, interoperability, and scalability of systems are becoming increasingly important, especially in enterprisewide computing environments with a variety of heterogeneous databases. A number of vendors are developing human resource systems that will run under UNIX. The trend toward UNIX-based systems will undoubtedly grow in strength over the next year.

Imaging–There are many potential applications for imaging in human resources, and use of imaging systems is definitely on the increase for areas such as applicant tracking. Because of the large volume of input required to establish and maintain human resource applications, data entry bottlenecks are common and frequently inhibit the overall effectiveness of the system.

4. Key Applications

The growth in the availability of human resource/payroll system software applications over the last several years has been remarkable. Exhibit V-3 lists 42 different human resource application areas for which products are currently on the market. The bulk of this expansion of products has occurred in the PC marketplace. The number of programs available has increased from 275 programs in 1986 to more than 1,500 in 1993. Fully 73% of the available software has been written for the PC platform. The strong, continued growth of PC-based human resource software

applications has been driven by the availability of relatively inexpensive, but very powerful relational database technology and advanced software development tools. These tools have allowed developers to bring sophisticated products to the marketplace much faster and at a significantly lower cost than typically has been the case for midrange- and mainframe-based software.

Beyond a question, the hottest application area within human resources continues to be employee benefits administration. Within the benefits area, flexible benefits administration is the most important area of growth. The critical nature of this area is apparent from the number of benefits applications now on the market (536). Benefits-related application software products account for more than 37% of all the human resource software on the market and are the largest specialty area in total number of packages.

Exhibit V-3

Human Resources Application Software Packages

Human Resources Specialty	PC	Midrange	UNIX	Mainframe
Applicant Tracking	46	4	7	4
Skill/Employment Testing	52	0		
Relocation	7	2	2	2
Equal Employment Opportunity	33	2	4	0
Job Analysis/Description	17	0	0	0
Job Evaluation	21	0	0	0
Salary Survey	7	0	0	0
Salary Planning/Budgeting	5	0	0	0
Sales Compensation	3	0	1	0
International Compensation	6	0	0	0
Executive Compensation	10	0	1	0
Integrated Compensation Admin.	16	0	0	0
Defined Contribution Plan Admin.	58	13	4	12
Defined Benefit Plan Admin.	25	5	5	11
Benefit Calculations	64	2	6	2
Pension Trust	9	1	2	2
Pension Plan Distributors	1	1	1	3
Section 450 Testing	3			
Flexible Benefits	56	5	5	7
Health Claims Administration	30	14	10	10
Health Care Cost Control	36	7	6	16
COBRA Compliance	15	2	2	0
Benefits Communications	20	0	1	2
Canadian Pension Administration	13	2	2	3
Integrated Benefits Admin.	18	8	6	7
Training Management	85	7	8	2
Career Development	20	1	0	
Organization Development	19	0	0	0
Performance Management	62	0	1	0
Human Resources Planning	14	0	0	
Organization Charting	18	0	0	0
Position Control	1	0	0	10
Personnel Policy	13	0	0	0
Survey Processing	25	0	1	0
Labor Relations	9	0	1	0
Safety/Health/Environ.	78	15	6	9
Risk Management	16	4	7	3
Employee Health	52	0	2	
Employee Scheduling	19	1	3	0
Attendance/Time Keeping	19	3	6	4
Total Quality Management	20	1	0	0
Payroll	43	18	16	7
Comprehensive HRMS	69	31	28	16
Total Packages	1,153	148	146	137
Grand Total: 1,584				

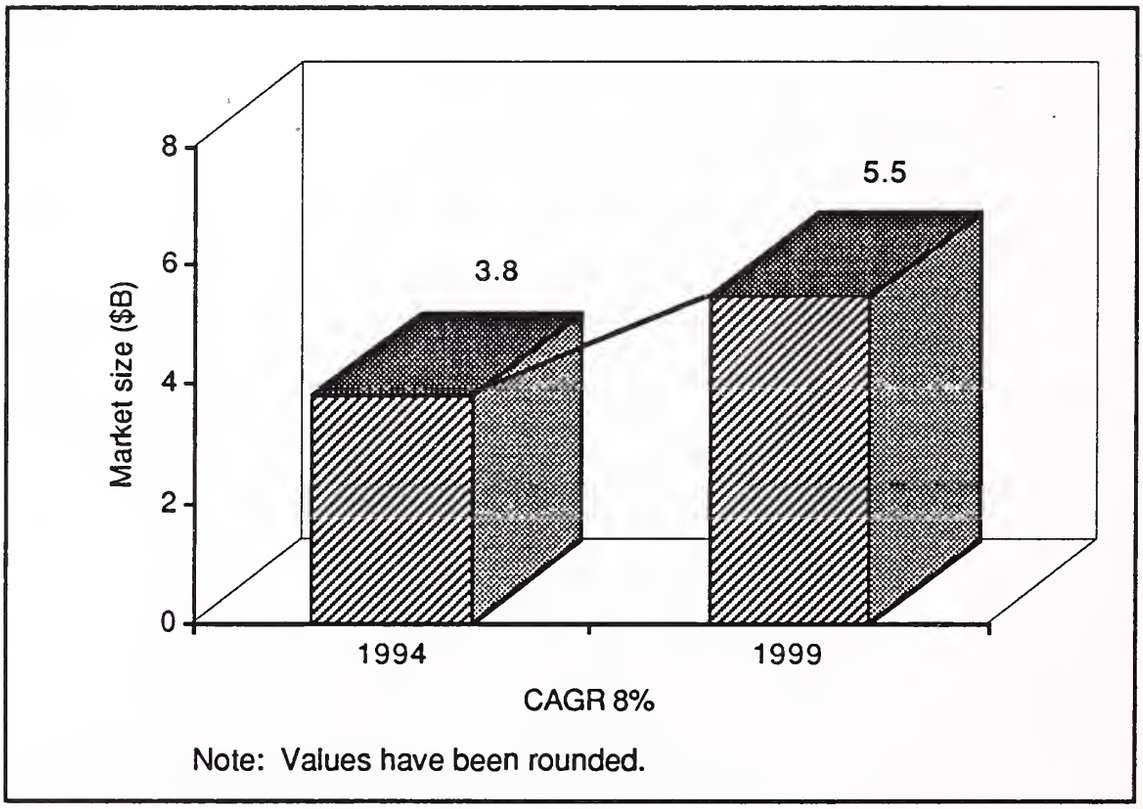
C
Market Forecast

1. Market Overview

The Human Resources information services market will continue to show moderate 8% growth during the five year forecast period, as shown in Exhibit V-4, below. The entire information services sector will grow at a CAGR several points higher, due to the greater dynamism of industry-oriented market segments, which require and pay for, sharply focused applications software products and services. The market for human resources cross-industry services has been well-established for some time, and to the extent any market segment of information services may be so described, is "mature.'

Exhibit V-4

Human Resources Cross-industry Sector Information Services Market, 1994-1999



Note: Values have been rounded.

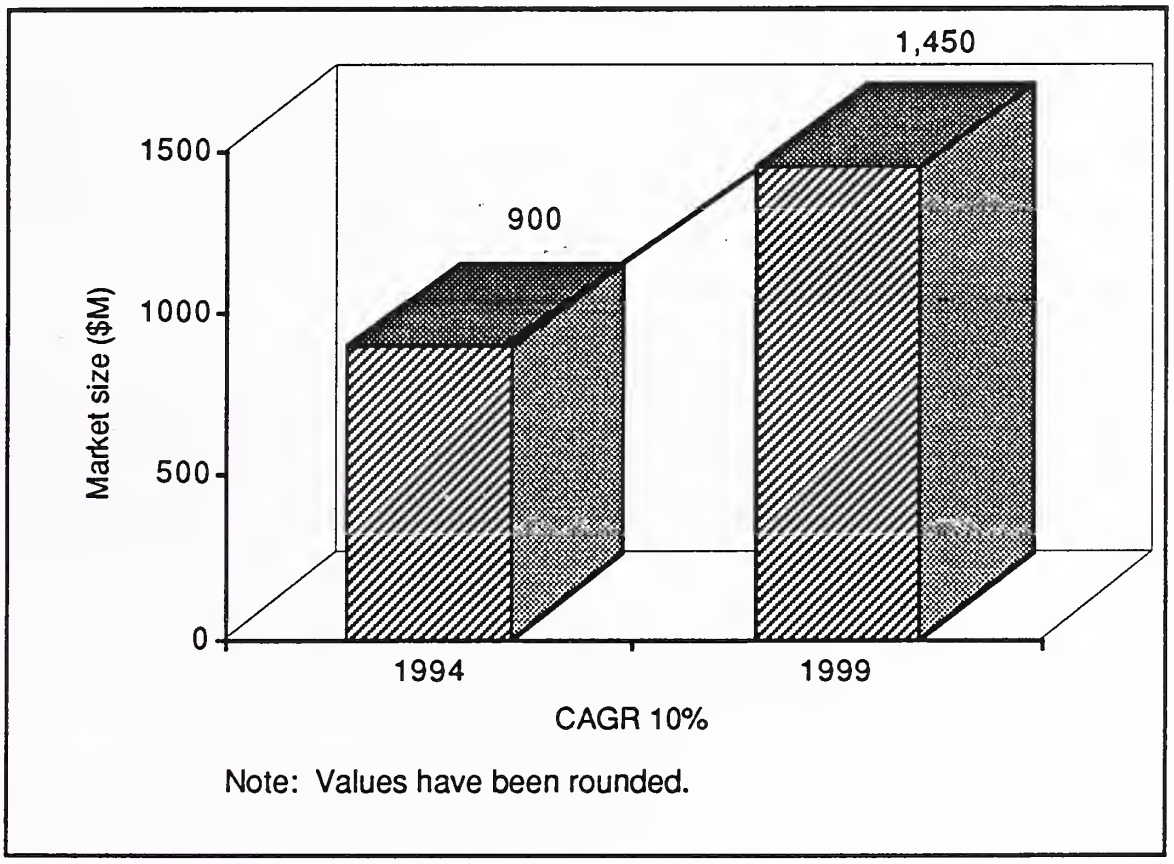
The largest growth factor will be the continuing strength in PC/workstation platform application software products, while the largest single sector will remain the payroll/HR processing services sector. These are discussed in more detail in the sections that follow.

2. Applications Software Products

The overall applications software products market will grow at a rate of 10% over the next five years, as shown in Exhibit V-5. INPUT has reduced its long-term forecast from last year's 14% CAGR, based largely on the anticipation that the current 20%+ growth in PC software products cannot continue at that rate, and the drag that slowing sales in mainframe and minicomputer segments will exert on the HR software market overall.

Exhibit V-5

Human Resources Cross-industry Sector Applications Software Products Market, 1994-1999



Note: Values have been rounded.

Mainframe software products–The trend toward downsizing and outsourcing of mainframe systems and applications shows no signs of diminishing. Also, the strong migration patterns of new and existing applications to client/server architectures should continue over the next few years. Combined, these two phenomenon will minimize growth in this market sector, at a 4% CAGR. For the most part, expenditures on mainframe products will be for maintenance fees and licensing of software upgrades for installed products.

There will be some movement toward client/server architectures using mainframes as the servers for corporate databases, while allowing

desktop users to connect via GUI's while using localized subsets of those databases.

Minicomputer software products–Like its big brother, minicomputer software products are being diluted by the growing popularity of PC-LAN solutions. With the exception of the IBM AS/400, no real penetration with midrange platforms has been achieved in this market. However, in large multisite enterprises, minicomputers are finding use as file servers to PC-LAN users, or as gateways to host-based mainframe corporate systems. INPUT forecasts a modest growth rate of 6% over the next five years.

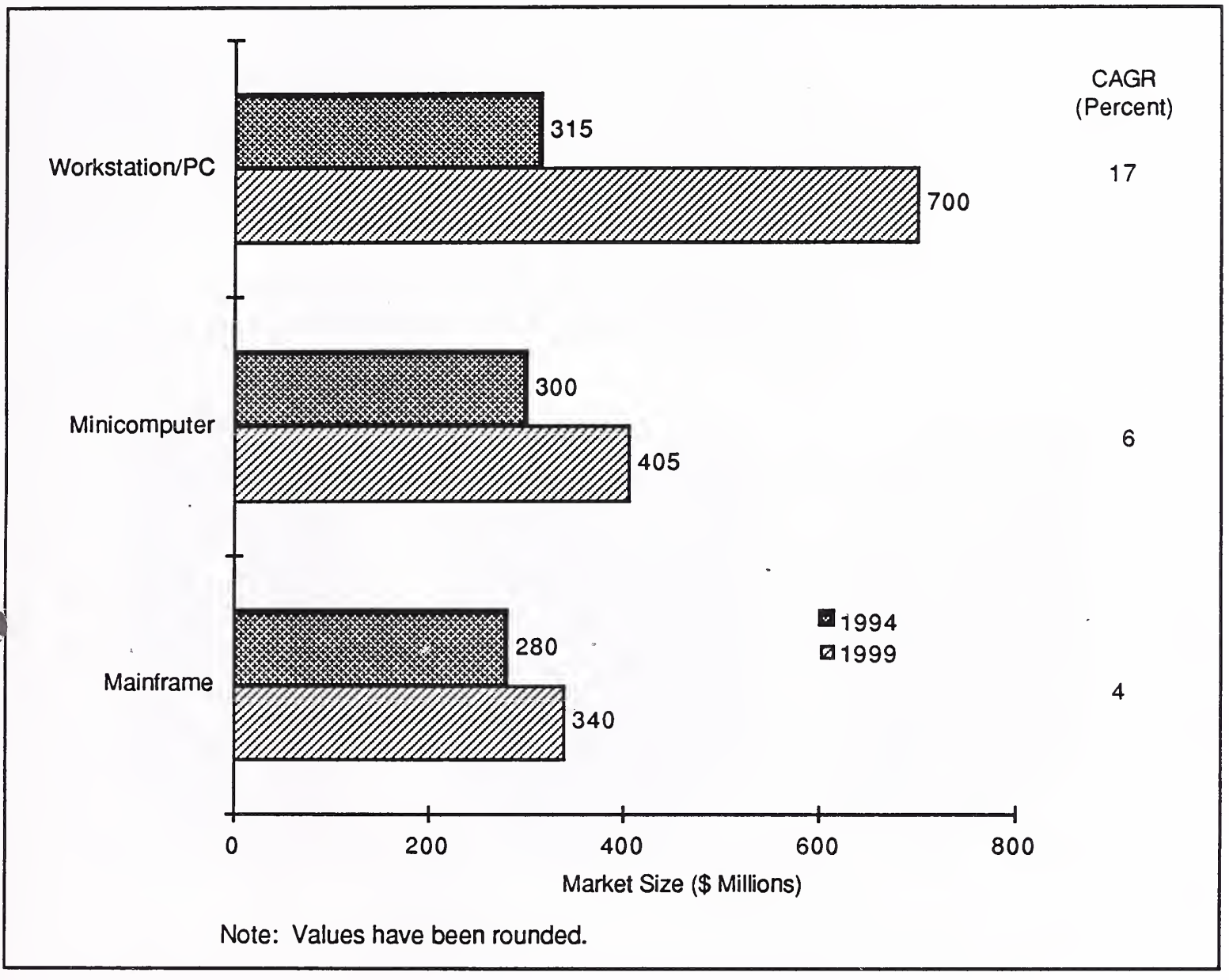
Workstation/PC software products–All of the real growth in the software products market is occurring here. Vendors like PeopleSoft are growing rapidly, based on their broad applications capabilities and user-friendly GUI, resident on PC's. The movement toward client/server systems is also helping growth in this segment, as complex solutions move into desktop-based C/S environments, especially for larger companies with multiple locations. All major players have either announced a client/server version of their products, or are working feverishly to develop one.

INPUT's 1993 human resources report projected a 25% CAGR for this market. But a review of current market conditions, and strong competitive price pressures, leads to a smaller growth rate forecast-17%. Even at this lower figure, workstation/PC software will become the largest market segment this year, and comprise 50% of the market in 1999.

The specific market forecasts for the three platform-oriented HR software product categories are shown in Exhibit V-6.

Exhibit V-6

Human Resources Cross-industry Sector
Applications Software Products Market by Platform, 1994-1999



Note: Values have been rounded.

3. Processing Services

The HR processing services market is the largest product/service category in this cross-industry, and is driven by the long-term steady growth rate in the payroll processing services market. This market is dominated by ADP, with Ceredian and Paychex also having significant market shares. In fact, these three vendors control nearly 70% of the market, with the balance being shared by regional and local vendors, including many banks. This oligopoly became even greater in early 1993, when ADP acquired the Bank of America's Payroll processing division, which ranked #4 in revenues at that time.

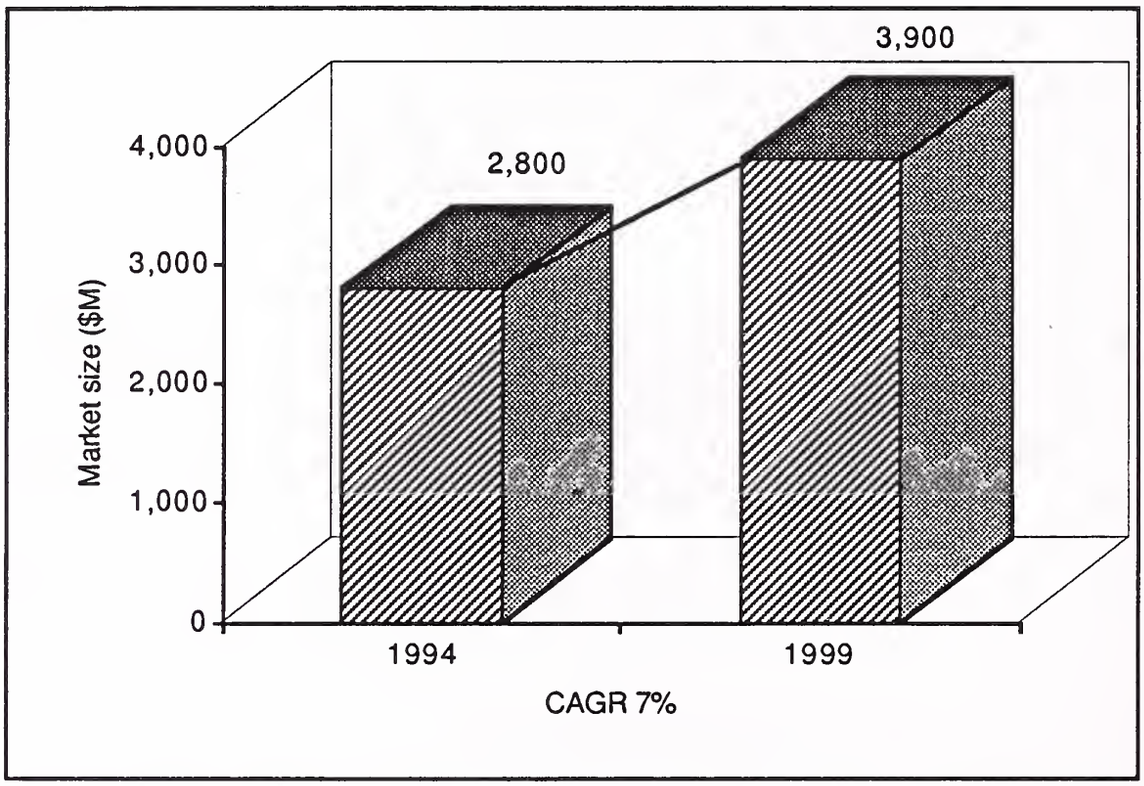
ADP has assembled an impressive growth machine, which, even without acquisitions, has sustained double digit annual growth rates for many

years. The company has moved to minimize its exposure in the batch-oriented processing services sector by also offering many clients the option of preparing and transmitting their payroll data directly from their in-house PCs.

The processing services market grew at 9% during 1993 as the gradual U.S. economic recovery generated more payroll checks. The longer-term forecast is for growth in the 8% range for the next two years,, subsiding to 7% in the later years of the forecast. The forecast is shown in Exhibit V-7, below.

Exhibit V-7

Human Resources Cross-industry Sector Processing Services Market by Platform, 1994-1999



INPUT has increased the estimate of the 1993 market size from approximately $1.9 billion, to nearly $2.5 billion. The reason for this is that the three leading vendors–ADP, Ceridian and Paychex–account for almost $1.8 billion by themselves, and INPUT estimates that another 30% of this market is occupied by regional and local processors.

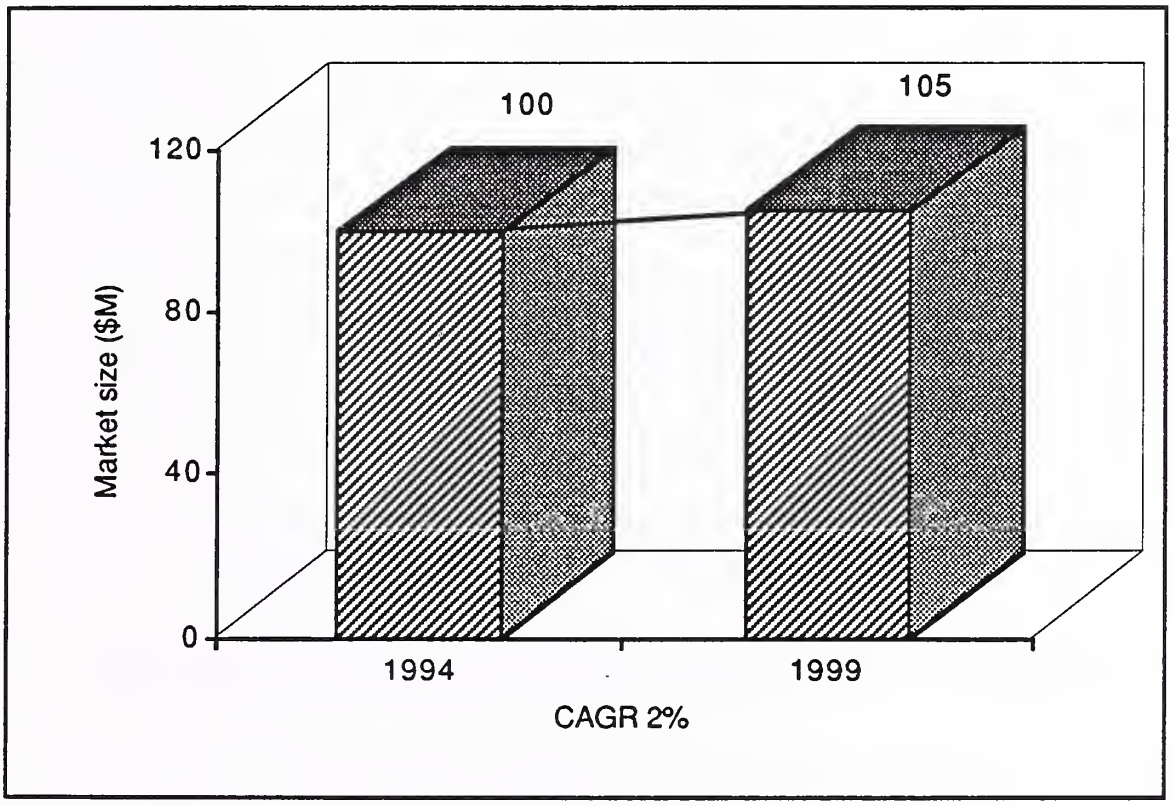
4. Turnkey Systems

This is the smallest and least dynamic of the product and service categories, growing at only 2% during the forecast period, as shown in Exhibit V-8. Most software vendors have chosen not to deliver low-

margin PC equipment as part of a bundled solution, hence the much stronger growth in the software products market. With the increasing commodization of hardware, there is limited motivation for software companies to even try to become a value-added resellers. There is more appeal in providing VAR/turnkey vendor delivery of midrange systems, so HP, Digital and IBM, with the AS/400, are all striving to expand those channels. But the majority of software vendors is choosing not to be a hardware player. Thus the HR turnkey systems market will become less important as the forecast period comes to a close.

Exhibit V-8

Human Resources Cross-industry Sector Turnkey Systems Market, 1994-1999



D
Conclusions and Recommendations.

1. Conclusions

The Human resources sector is a relatively mature information services cross-industry sector, with moderate growth forecast for the future. Downsizing of many corporate workforces has diminished the demand for many transaction-oriented HR services, but there are new requirements for more sophisticated, fully integrated HR systems.

Within that stable framework, there is one dynamic submarket that offers significant potential–the workstation/PC applications software products sector. Here, the availability of new, user-friendly, lower-cost applications will continue to drive significant growth. New entrants are most likely to be seen here, as pervasive networking, and client/server architectures provide a technical framework for many new applications products to be introduced, in specific narrowly targeted functional areas.

Vendors considering entry into the Human Resources market are best advised to focus on desktop-based applications software products, and associated professional services and systems integration services, as a means of penetrating this sector.

2. Recommendations

The recommendations published in last year's expanded report on Human Resources are still mainly applicable, and are published in slightly modified and updated form here.

a. Key Technological Issues for Vendors

Key technological issues facing the human resources cross-industry sector are summarized below:

- Developing viable, cost-effective client/server/open system products
- Developing Windows/GUI-based products as an alternative to traditional character-based systems
- Providing enhanced networking capabilities for multisite, remote user access for database maintenance and reporting
- Achieving mainframe power with networked PC- based systems/workstations
- Integrating/interfacing payroll/specialty applications with general purpose or comprehensive HRMS
- Investing in new product development versus adapting traditional "legacy" systems
- Designing products that fully use true relational database technology
- Providing users with powerful, flexible English-like reporting and inquiry tools
- Integrating graphics more fully with database report-writing capabilities

- Maintaining/updating products to reflect rapidly changing user and governmental-reporting requirements.

b. Key HRMS Issues

Key business issues faced by users of human resources and payroll products and services are summarized below:

- Choosing and committing to a standard technology platform for future HRMS development/acquisition
- Conversion/integration of old or highly customized systems with new vendor-provided advanced technology products
- Determining how to most effectively integrate/interface payroll and human resource systems and related subsystems
- Defining corporate roles and responsibilities between IS, human resources and payroll for system acquisition, implementation, and administration
- Determining the most effective method for providing corporate and remote user access to human resource systems for database maintenance and reporting.

3. User Recommendations

Recommendations for users of human resources products are summarized below:

- Initiate internal systems audit to assess functionality and adequacy of existing manual and automated HR systems
- Develop a coherent strategy for short-term and long-term HR systems development and implementation
- Establish a dialogue with central IS over corporatewide computing directions and policies; define and clarify roles and responsibilities for system acquisition, implementation and management
- Consider necessary organization changes and staffing level changes to achieve tighter integration of human resource and payroll functions and responsibilities
- Identify and develop dedicated internal resources to manage HRMS system development, implementation and administration.

4. Vendor Recommendations

Recommendations for vendors are based on the same issues discussed for users and are summarized below:

- Provide for a high level of user customization to meet unique organizational requirements for human resource/payroll processing and reporting
- Incorporate advanced relational database technology into all HR products
- Improve power, flexibility and functionality of *ad hoc* reporting and database inquiry tools
- Better integrate advanced graphics capabilities with HR/payroll database reporting
- Develop innovative voice recognition and image processing applications for HR/payroll functions such as employment, benefits enrollment, personnel transaction processing, and other HR/payroll areas
- Focus on enhancing vendor-provided consulting services to help ensure products are fully implemented and that customers have access to competent technical assistance for system customization and modification
- Enhance vendor-provided customer training to include advanced user and technical training in system implementation, database programming, system customization and modification
- Fully integrate product lines to eliminate or reduce need for costly and inefficient HR/payroll and subsystem interfaces.

Office Systems

A Industry Definition

Office systems is truly a cross-industry application. Because the majority of office tasks are generic in nature, office systems are almost exclusively purchased from outside vendors rather than developed in-house. Furthermore, INPUT believes that office systems will not become industry-specific. Accessibility to vertical applications software products will be available through, and integrated with, office systems. INPUT divides the office systems sector into six application areas: integrated office systems, word processing, desktop publishing, electronic publishing, graphics and document imaging software.

1. Integrated Office Systems (IOSs)

IOSs integrate the applications that perform common office tasks. Typically these tasks include the following core applications, all of which are accessed from the same terminal, microcomputer or workstation:

- Electronic mail
- Decision support systems
- Time management
- Filing systems

IOSs enable office workers to use applications that are resident on a number of hosts or servers, thus creating a corporate communication environment through integrating line-of-business software with personal software productivity tools. IOSs capitalize on the cross-platform architectures of major vendors. Major hardware vendors such as IBM, Data General, Digital, Hewlett-Packard and NCR all offer IOSs.

Workflow and groupware products are also included within the IOS definition.

2. Word Processing

Word processing is the most common microcomputer application and is a basic application within the office systems sector. Word processing addresses several levels of functionality, from the production of simple correspondence to large document generation where many people within different departments have input.

3. Desktop Publishing (DTP)

Desktop publishing refers to the page-design software programs that allow small and mid-sized organizations to publish printed documents (brochures, catalogs, newsletters, reports, etc.) from the desktop. The primary functions of DTP software include the manipulation of the following functions:

- Layout and design of columns
- Text manipulation (font type)
- Graphic manipulation
- Print control (color type, paper type)

4. Electronic Publishing

Electronic publishing includes composition, printing and editing software for documents containing multiple typefaces and graphics, including charts, diagrams, computer-aided design (CAD) drawings, line art and photographs. Electronic publishing products may also have different data formats, such as text, graphs, images, voice and video.

The fundamental difference between electronic publishing and desktop publishing is that electronic publishing encompasses a method of document management and control from a single point regardless of how many authors/locations work on a document. Desktop publishing (DTP), on the other hand, is considered a personal productivity tool and is generally a lower end product residing on a personal computer.

5. Graphics

Graphics packages that are used for presentations or freehand drawings and/or are ancillary to desktop publishing are part of office systems.

Thus, the graphics component of the office systems sector includes the following elements:

- Presentation graphics, which represents the bulk of office systems graphics. Most presentations involve a combination of graphs and text. They are used to communicate a series of messages to an audience rather than to analyze data.
- Paint and line art drawing programs are used for illustrations.
- Page layout programs integrate the text from word processing programs with illustrations.
- Electronic form programs allow users to create and print forms in-house. Some applications work with OCR scanners, allowing users to scan pictures and logos directly onto the forms.

6. Document Imaging Software

Document imaging software is that which allows users to manipulate (store, retrieve, or print) images that have been scanned from paper documents. The applications that imaging software generates include full text retrieval, document management and database management. Document imaging software is a component of an imaging system. Hardware components of imaging systems include scanners, image servers, workstations, optical drives, printers and storage devices.

B
Key Trends and Issues

Over the past three years the office systems sector has been shaped by the increasing level of PC connectivity and local-area network (LAN) interconnectivity. This connectivity movement continues to evolve due to the strengthening interrelationship between innovative data communication technology and changing business practices. The merging of these two trends has resulted in a flattening of the corporate organizational structure and a flattening of the hierarchical network architecture. This new business paradigm encourages workers to operate within an office system environment in an effort to increase productivity and control operating costs. Productivity is improved because workers have quicker access to information, and operating costs decrease because workers are sharing common computing assets. Thus, organizations are strategically leveraging workers' connectivity to each

other and their corporate computing assets (databases, etc.) to boost their competitiveness.

As connectivity efficiency and data integrity between LANs and WANs improves, organizations will explore new enterprise-networking solutions. This push toward *connectivity* has resulted in a shortage of software that will support and manage applications across the enterprise and heterogeneous platform environments.

As client/server products gain momentum, relational database management systems (RDBMS) companies are entering the fray. For example, Oracle now has its own electronic mail and word processing packages. Applications software products within these environments will not be limited to office products; the IOS will act as the integrating environment. INPUT believes that office systems vendors are attempting to meet user demands for integration and enterprise-wide solutions by porting their products to Windows, developing client/server solutions and beginning to provide groupware and workflow solutions.

In addition to the changing network architecture paradigm (from host-based to distributed networks), INPUT has ascertained that the office systems sector is also being impacted by the blurring functionality between network operating systems (NOS) and personal computer operating systems (OS). Innovative products—such as Microsoft's Windows NT and Windows for Workgroups (peer-to-peer connectivity) and Novell's NetWare 4.0—are rapidly bringing the NOS and OS markets closer together.

Developers of operating systems (System 7, Apple Computer; OS/2, IBM; Windows NT, Microsoft; as well as UNIX-based systems) are closing in on the NOS market by increasing the sophistication of their products to include functions that address the network as well as the desktop. New operating services are now designed for the following network-related elements: security, electronic mail, directory and database.

Lotus is also changing the competitive nature within the office systems sector with its groupware product, Lotus Notes. Lotus Notes is the most successful groupware product so far, and one of the first truly distributed systems. Notes facilitates group communications for decentralized or geographically dispersed organizations and is being used to develop and deploy such applications as customer tracking, status reporting and project management. Although it is not specifically billed as an office system, it is being used for office systems applications such as information distribution, electronic mail and collaborative discussions or authoring.

In the first quarter of 1994, AT&T and Coopers & Lybrand contracted with Lotus to implement Notes on a large scale. Coopers will install the product globally in 28,000 company PCs, with a final installation total of 40,000 likely. AT&T is developing with Lotus a public network version of Notes. "Network" Notes will be available in early 1995 and will allow work groups collaborations on an enterprise-wide basis.

In addition to the IOS segment, vendors are increasing the level of software sophistication within other office systems segments. The sophistication of word processing packages is now enabling these packages to encroach upon the domain of desktop publishing packages. The most recent Microsoft and WordPerfect versions supply graphic image importing, graphical page preview, support for multiple type sizes and styles, detailed page layout controls, and drivers for high-end laser printers and typesetting machines.

Windows has created an opportunity for word processing vendors to provide the kinds of functionality initially only provided within desktop publishing products running on Macintosh computers. As word processing packages take on the ease-of-use features and functionality of what used to be the sole domain of desktop publishing products, DTP vendors such as Aldus and Ventura Software will be pitted against WordPerfect, Lotus and Microsoft.

The distinction between graphics-based word processing and DTP is becoming blurred. Because DTP markets are being usurped at the low end by word processing packages, DTP vendors are looking at the sort of shared document production facilities that high-end, workstation-based publishing packages have always had. They are also attempting to automate more of the design process. In January 1994, Digital announced its PC Publishing Solution, a suite of software tools bundled for preconfigured PC-based desktop publishing systems. Digital's solutions include Adobe Illustrator, Photoshop, Aldus Pagemaker or Quark XPress, and range in price from $9,000 to $12,000.

Imaging technology is just beginning to move beyond its embryonic stage, which began in the mid-1980s, and is now at a point in its development and pricing structure where users are seriously considering its capabilities at the desktop level within an organization. Research for this report indicates that the document imaging market will increase 77% in 1994, from a value of $277 millions in 1993. Vendors in this area include Lotus, with Notes Document Imaging Version 2.0, a product to developed with Eastman-Kodak Company's Imagery Software Inc. subsidiary.

As organizations reengineer their business processes, INPUT believes that issues pertaining to workflow automation keep escalating in importance. Imaging is a vital component of workflow automation and

an important factor in the migration from a paper-*laden* to a paper*less* office. The core of the workflow automation philosophy is the concept that the network is the most expedient vehicle for document filing, routing, and management. Forms routing is an example of a workflow automation application that prompts the user to correctly complete and forward particular documents (such as expense reports and loan origination forms).

Relationships between imaging and workflow vendors will facilitate tighter interoperability between the imaging and workflow technologies, resulting in application packages that fulfill more of the users' automation requirements. WordPerfect Corp. in 1993 established distribution partnerships with imaging vendors ???? Software, Keyfile Corp., PaperClip Imaging Software, Simplify Development Corp. and Watermark Software. WordPerfect's Office word processing and workflow system, with these imaging partnerships, is aiming for Microsoft's Office market share, still the largest office/workgroup seller in this market.

However, a critical factor in satisfying user demand for imaging applications will be the vendor's ability to supply products that address aspects such as data security, recovery, and backup; ease of operating use; and compatibility with users' existing office systems software. Barriers for imaging technology still include the acceptance by MIS of new technologies.

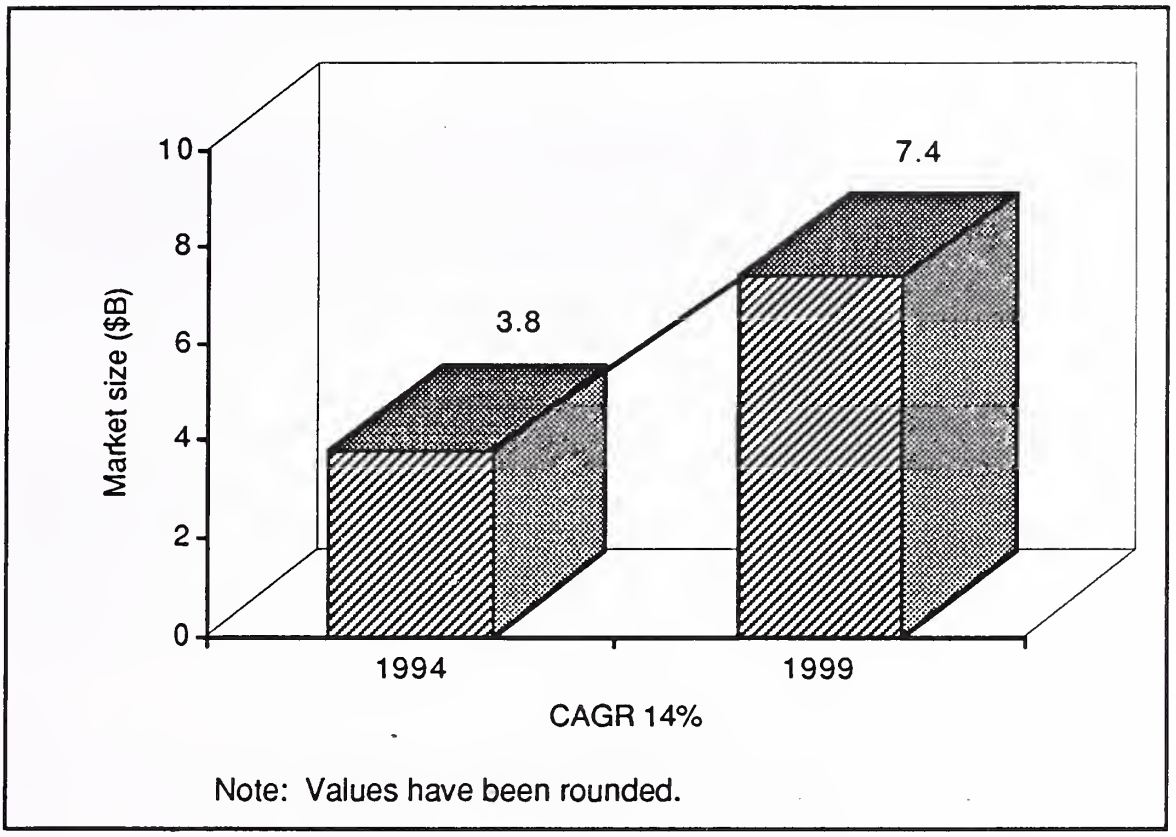
INPUT believes that the increasing interrelationship between innovative data communications technology and changing business practices is having a dramatic affect on the office systems cross-industry sector. As a result of these market forces, the office systems sector is becoming intensely competitive—which, ultimately, translates into improved solutions and pricing for the user.

C
Information Services Market Forecast

INPUT estimates that the 1994 aggregate size of the office systems cross-industry sector, in terms of user expenditures, amounted to $3.8 billion (see Exhibit VI-1).

Exhibit VI-1

Office Systems Cross-industry Sector Information Services Market, 1994-1999

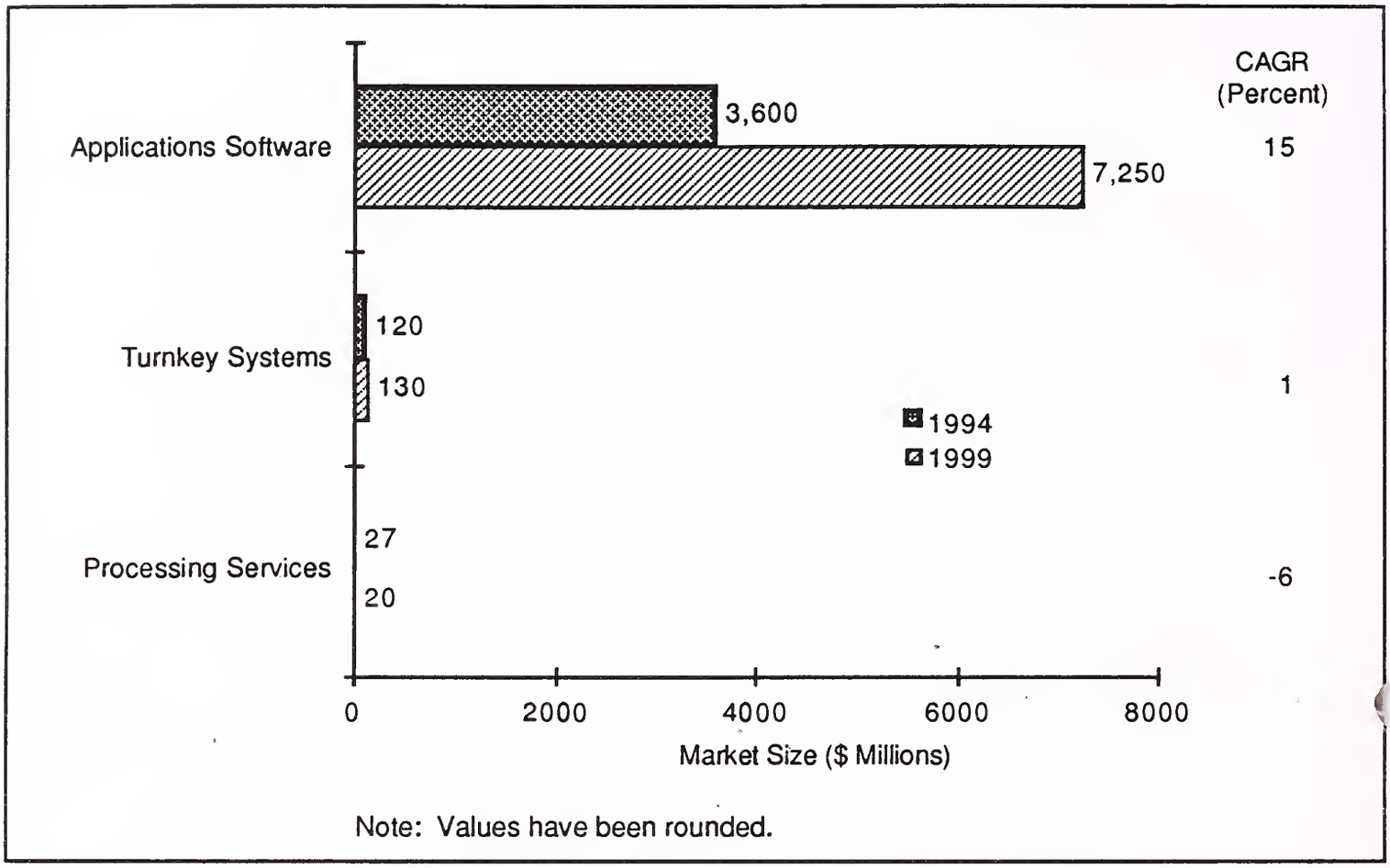


Note: Values have been rounded.

INPUT believes that innovative technology, business reengineering, innovative service offerings, and vendor alliances/mergers will drive aggregate user expenditures for office systems from $3.8 billion in 1994 to $7.4 billion in 1999, a CAGR of 14% (see Exhibit VI-1). The applications software component of the office systems sector amounted to $3.2 billion in 1993, or 96% of the aggregate office systems user expenditures. The turnkey systems product/service market represents the second largest contributor to the office systems expenditure total, followed by revenue generated by processing services. This product/service market ranking is duplicated in 1999 (see Exhibit VI-2).

Exhibit VI-2

Office Systems Cross-industry Sector
Information Services Market by Product/Service Market, 1994-1999



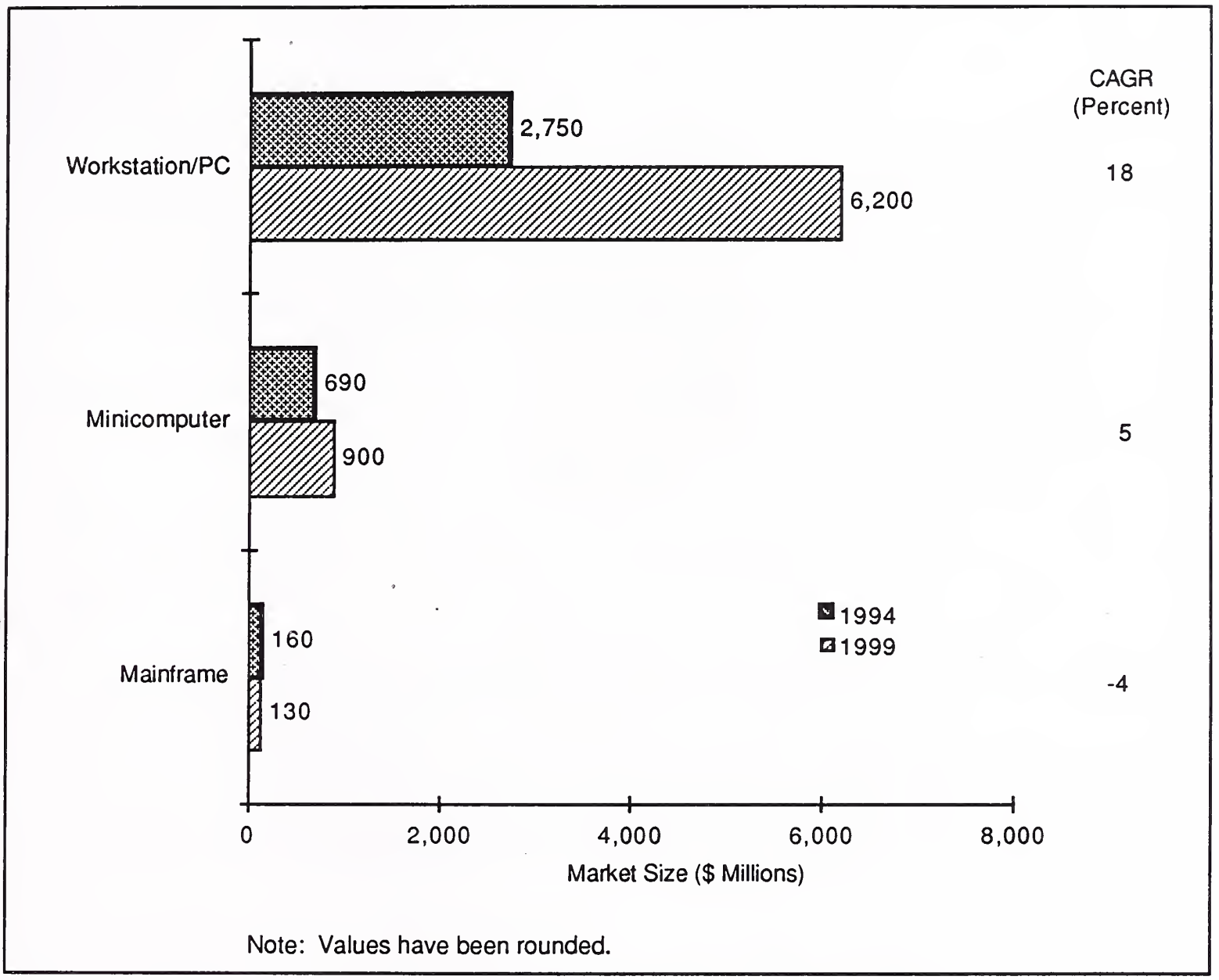
Note: Values have been rounded.

1. Applications Software Products

Exhibit VI-3 presents INPUT's user expenditure forecast for office systems applications software products by platform type. The dominant contributor to the applications software product/service market, representing 75% of the total, are user expenditures for workstation/PC applications. INPUT estimates that user expenditures for applications pertaining to the workstation/PC platform amounted to $2.7 billion in 1994 and will grow to $6.2 billion in 1999, a CAGR of 18%.

Exhibit VI-3

Office Systems Cross-industry Sector
Applications Software Products Market by Platform Size, 1994-1999



Note: Values have been rounded.

INPUT believes that the most significant factor driving the growth of aggregate applications software expenditures is the changing information systems model. As companies embrace downsizing, implement enterprise computing and utilize GUIs, the need for applications to support these technologies is critical. Applications that were formerly host-based will now be acquired or rewritten for the PC/LAN or midrange system. However, client/server applications are still in the development stage for many vendors.

A pent-up demand for new products and solutions will drive growth in the workstation/PC platform segment. As new operating systems, such

as Windows NT are introduced, the market for applications supporting them will increase.

Growth of expenditures for mainframe- and minicomputer-based applications software products is due almost exclusively to price increases on previously existing WP and IOS licenses. To remain relevant to PC-oriented offices, midrange vendors all have office systems strategies tying their minicomputers to PCs to share data and, eventually, work cooperatively. IOS is a way to showcase the fact that minicomputers can interact effectively with PCs. These vendors will do best in IOS among their existing customer bases. Only a small portion of the expenditure on word processing applications software products is for mainframe-based products. Word processing on minicomputers is also rapidly diminishing as WP remains strongly positioned as a personal productivity tool.

Practically all expenditure growth for office systems applications software products will come from workstation/PC-based product sales.

A migration of all office systems products to Windows will continue to be a driving force for workstation/PC-based office systems products. In fact, the office systems market is embracing Windows more quickly and enthusiastically than any other cross-industry or industry-specific sector.

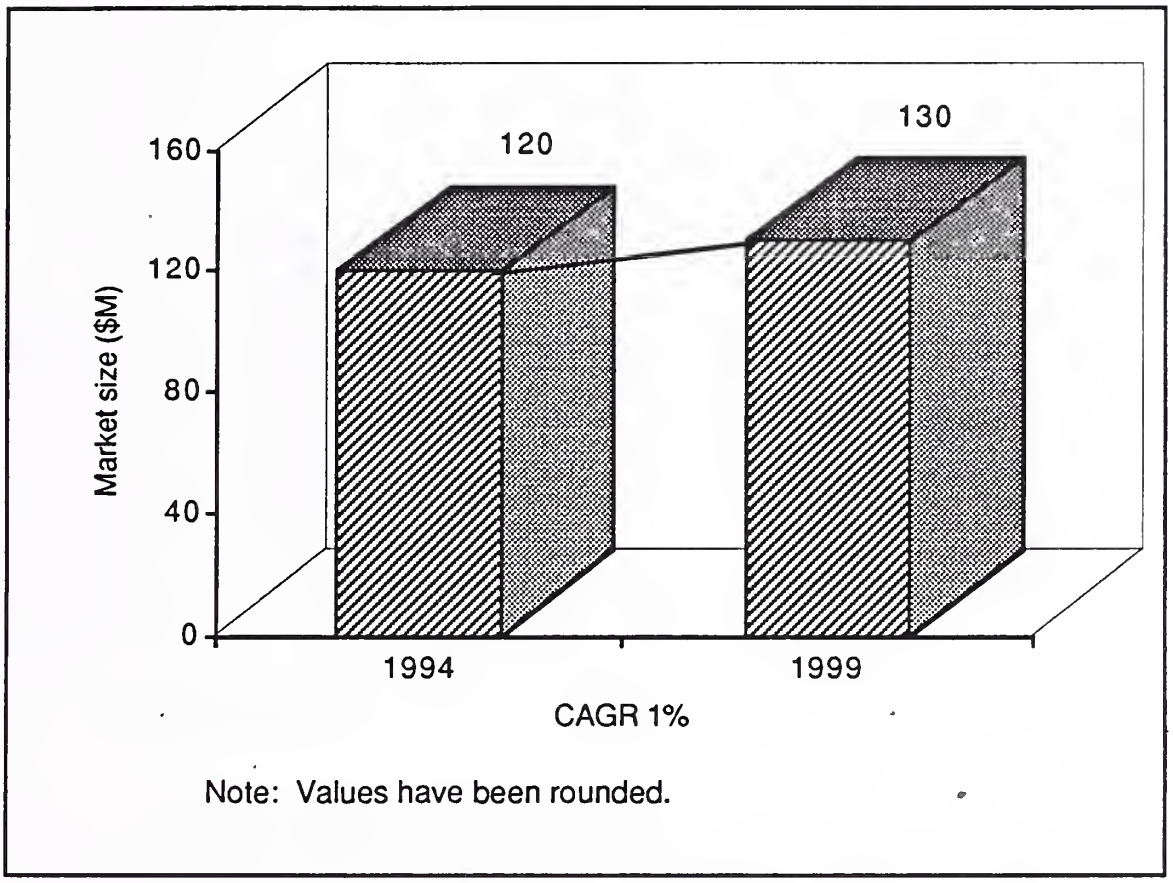
Historically, of course, desktop GUI-based applications truly grew through Macintosh platforms in the desktop publishing market. Now, Widows has become a *defacto* standard and will continue to drive the software market with such products as Microsoft Office and Windows for Workgroups. In fact, the surge in office systems software demand is likely to explode so widely, INPUT has revised this for 1998 to reflect in increase market value of $6.3 billion, an increase from the $5.4 billion forecast in 1993.

2. Turnkey Systems

INPUT estimates that user expenditures on the turnkey systems product/service market will grow from about $122 million in 1994 to $130 million by 1999, a CAGR of 1% (see Exhibit VI-4). The slow product/service market growth is due to a trend among DTP applications software products and turnkey vendors to port their software to a number of standard hardware platforms. As this occurs, inventory carrying costs for multiple hardware platforms become prohibitive. The Digital product noted earlier in this report is an example of a virtual turnkey product that generates revenue by bundling existing products in turnkey-like suites. As vendors like Microsoft and WordPerfect offer more functions and features in their shrink-wrapped suites, the turnkey market will further slow.

Exhibit VI-4

Office Systems Cross-industry Sector
Turnkey Systems Market, 1994-1999



Note: Values have been rounded.

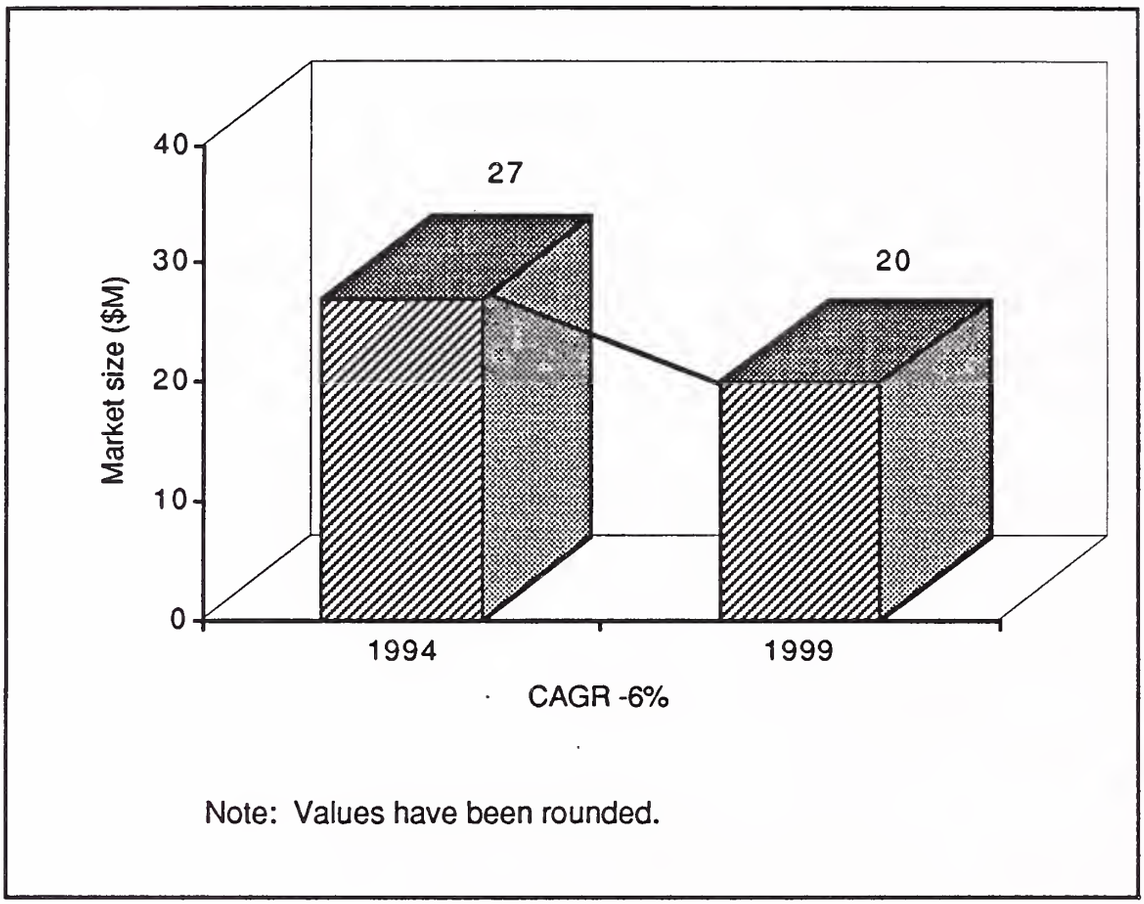
Additionally, turnkey growth is slowing for electronic publishing as well, because the market for electronic publishing is simply not large enough to sustain a large number of VARs. The merger of Adobe and Aldus in early 1994 may pump more life into this segment..

3. Processing Services

INPUT forecasts that the expenditures that are applicable to the processing services product/service market will decrease from $27 million in 1994 to $20 million in 1999 (see Exhibit VI-5). The most important factor inhibiting growth in processing services is the current price/performance of PCs/workstations and the increased availability of software. Microcomputer technology has become more affordable, even to the smallest of businesses.

Exhibit VI-5

Office Systems Cross-industry Sector Processing Services Market, 1994-1999



Note: Values have been rounded.

The processing services portion of the office systems information services market largely consists of presentation graphics services performed by outside service bureaus. Service bureaus convert the presentation graphics images either to color slides or to hard-copy prints used in the actual presentation. However, the cost of the software and equipment required for this has become so inexpensive and usable that outside graphics support is decreasing more rapidly than forecast last year. It is conceivable that processing services may become irrelevant in office systems during the current forecast period.

D
Conclusions and Recommendations

1. Conclusions

- Applications software products will continue to be the largest, most important category of the office systems segment. The declining cost and increased power of the personal computer has brought applications to the desktop and networks in a more cost efficient way than ever before.

- Innovative, powerful products, such as Louts Notes and WordPerfect's Office lead the market because they offer network access to suites of applications operating in an integrated fashion. This makes it easier and more appealing for users who demand increased functionality and ease-of-use.

- Vendors are pursuing alliances and partnerships to offer wider ranges of word processing, spreadsheet and publishing applications to the office systems market. This is because of demand and the strategic benefits for smaller vendors.

2. Recommendations

- The importance of PCs to the office environment will continue to demand that vendors provide cost-effective, integrated product suites to the market.

- Larger vendors continue to realize that their primary product offerings require the support of products from smaller vendors in order to give users the desktop-or network-based functionality they continue to demand. The alliances noted in section B between WordPerfect and several imaging vendors in a good example.

- Microsoft Office and other office systems suites are increasingly tied to network. This is crucial, as the network becomes more and more important in the office systems environment.

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Planning and Analysis

A
Industry Definition

The planning and analysis industry, as defined by INPUT, consists of four applications areas: spreadsheets, project management, executive information systems (EIS) and financial modeling and other types of more generic decision support solutions.

The planning and analysis applications software products market is among the fastest growing applications software markets. This reflects changes in product functionality, hardware platform support and ease-of use factors in recent years.

Although spreadsheets have long been a general purpose planning tool, project management and financial modeling, until more recently, have been more the domain of job specialists.

Also, many of the financial modeling and project management tools historically required larger processors, such as mainframes and minicomputers for their computationally-intensive and multiuser requirements.

Over the past few years, the dramatic improvement in price/performance of workstations/PC platforms has encouraged the porting of most planning and analysis tools to lower cost platforms. The workgroup usage requirements of many of these tools also made them early candidates for LAN- and client/server-based solutions.

The GUI of the client/server environments and the increasing incorporation of object-oriented feature enhancements have also greatly increased the ease-of use of many of these tools.

Most tools and products in the planning and analysis industry are now work/station or PC-based and many can be used in a client/server environment. Planning and analysis, as a functional cross-industry capability, is now a cost-effective resource available to users at multiple levels of business activity.

B
Key Trends and Issues

1. General Trends and Issues

a. Re-engineering the Corporation

The slower-growth U.S. economy of the 1990s is causing many companies to reassess their traditional approaches to doing business in order to increase their overall operational efficiencies. Many are working with the concept of re-engineering to improve upon traditional corporate work processes.

This is also being done to address the much more competitive global marketplace.

The use of planning and analysis tools is central to analyzing the efficiencies of current work processes, planning and implementing more efficient work process alternatives and for on-going work process efficiency measurement.

b. Client/Server Architectures

Recent INPUT surveys of a number of U.S. corporations showed that more than 50% of the respondents are making significant commitments to client/server computing.

Planning and analysis tools have been among the earliest applications ported to the client/server architecture. They are a natural fit for the distributed processing model. Many such tools can extract data from a number of corporate database platforms. A GUI-based client, that simplifies the ability to access and manipulate the data has been very important for the very high rate of adoption of such products by desktop users.

Decision support has been a major application area of client/server computing, and planning and analysis tools represent many of the more sophisticated decision support type applications.

c. Workgroup Applications

Corporate re-engineering has oftentimes resulted in the reduction of middle management layers and a transitioning to team-management as a way of addresses the efficiencies of the older hierarchical management structure.

This has helped foster the growth of the workgroup applications software products industry in recent years. Workgroup applications have also been a natural application for LAN and client/server-based IS architectures. Workgroup applications run the gamut from E-mail work flow image and document routing, E-mail enabled application routing, integrated project management planning, to multimedia desktop conferencing.

Increasingly, planning and analysis modules are being incorporated into the more general workgroup applications. Object-oriented enhanced operating systems, with object-linking features are creating the ability to embed and/or attach planning and analysis files to general workgroup applications. Project management is extending its range to the more general purpose planning functions of the corporations.

2. Applications Trends

a. Project Management Applications

Project management, over the last several years, has migrated outward from specialized industry-specific applications for construction and engineering and centralized IS software development to more generalized departmental user functionality.

Related to this is the use of project management applications in the structuring of work flow management systems within the corporation and for providing an infrastructure for enterprise-wide planning, budgeting, management and evaluation. The structured methodology of traditional project management systems can thus be brought to a number of corporate functional areas.

As with the other planning and analysis applications, the facilitator of this migration is the proliferation, growing power and ease of use of PCs and workstations. Project management software is now available for platforms of all sizes, and user-friendly applications are making it easier for users at all levels to make effective use of this planning tool.

Leading Products–Project management applications that are available for very complex, high-risk construction projects can cost tens of thousand of dollars, depending upon the platform and number of users. Such systems usually require users to be knowledgeable about planning and control concepts and the complex language syntax of project management programs. Examples of the very high-end systems are PROJECT/2 from Project Software and Development (PSDI) of Cambridge, MA; Multitrak Software's Multi-Project Architecture; and ARTEMIS from Lucas Management Systems of Fairfax, VA (formerly Metier Management

Systems). They are often customized for particular types of project management applications.

The bulk of sales in today's market is in the middle market range that can be subdivided into a high-end and low-end. The high-end product is generally priced between $2000 and $4000 for LAN-based PC systems and is generally designed for the power user and also frequently for enterprise-wide project management. Client/server versions can be much more expensive, in the range of $30,000 or more.

Products in this category include: Primavera's *Project Planner for Windows* (which is one of the technology leaders in this segment); Project Software and Development's *Qwiknet Professional*; Lucas Management Systems' Artemis *Prestige*; Computer Associate's *CA-Super Project for OS/2*; Applied Business Technology's *Project Workbench for Windows; Method/1* from Andersen Consulting; Welcome Software Technology's *Open Plan*; and *ViewPoint* from Computer Aided Management in Petaluma, CA.

The low-end of the middle market includes the most popular selling solutions: Pricing is generally in the range of $400 to $800 per package. These products are used by professional project managers, many of whom may be using them with a LAN, as well as by mainstream managers.

The best selling solutions in this product segment are Microsoft's Project for Windows, released initially in 1990 that features the first of the PC-based graphical user interfaces. Another major seller in this price range is Symantec Corporation's *Timeline for Windows*. PC-based Windows project manager solutions have significantly expanded the number of user of project manager software.

At the very low-end of the market are the personal information manager (PIM) products that allow for personal scheduling and calendaring. As hand-held, digital devices become more popular, such PIM solutions will likely become a principal applications. Current PIM solutions are generally sold as single-usage, pocket-sized machines.

Features–Primavera is considered to be one of the leading vendors of high-end project management software. The recently introduced Primavera *Project Planner for Windows* provides for new features as: support for multiple users, enhanced ease of use features, such as drag and drop capabilities, built-in support of Object Linking and Embedding (OLE), and the ability to display multiple project plans at the same time.

Microsoft Corporation's latest project management software release at $695 is designed for to be very user friendly with the enhanced interface

features. The Project 4.0 interface is consistent with interfaces of other Microsoft desktop applications. Other features include Object Linking and Embedding (OLE) 2.0, IntelliSense technology and Wizards. It also has workgroup capabilities, with E-mail interfaces. This includes workgroup buttons including task reminders, sending task requests, requesting task updates, sending projects in E-mail and timesheets.

Project 4.0 along with Symantec's new *Time Line* are also customizable and provide easier to use PERT charts, multiproject capabilities and ODBC support. *Time Line* has a new object-oriented structure that enhances program linkages with other applications.

Additional desirable features, particularly for client/server solutions, include multivendor database access, multiproject, multiuser and project simulation capabilities as well as greater ease-of-use.

Trends and Issues–A future need for project management/work management solutions will be for enterprise-wide project management connectivity. Products will also need to be more customizable to fit into what will become ongoing re-engineering processes at corporate sites. Distributed processing solutions, with access to multivendor databases will also be needed for corporate-wide interdepartmental planning applications.

It is anticipated that much of the current workflow product, which provides for shared usage and distribution of documents among common user groups, will be integrated with project management software capabilities over the longer term. IBM recently announced it is developing integration tools, known as building blocks for its $12,000 *Flowmark* project management and work group computing software to be released in July 1994. The integration tools will allow for the linkage of *Flowmark* with E-mail products, Lotus Notes and other applications on a network.

Action Technologies, Inc., a leading vendor of workflow products, has recently unbundled its workflow analyzer from its Action software system. The Action Workflow Analyst, a process-analyzer program, (priced at around $495) maps out business processes and graphically shows specific tasks, individuals and time spans involved and how functions interrelate.

Millennium System Products in Naples, Florida, recently introduced *WorkTime*–a combined project and work order tracking software solution for the AS/400. It helps management to determine employee workloads, project status, up to date costing and production bottlenecks.

An issue related to the proliferation of such project management/workflow tools is the variety of methodologies used with the different systems. Many project management vendors provide methodologies with their products and/or linkages to particularly CASE methodologies. Organizations will need to adopt particular methodologies that fit their cultures to work more effectively with such tools.

b. Financial Modeling and Planning

Features–Financial modeling is more of a generic Decision Support Software (DSS) tool rather than a specific application-based tool for calculating "the answer". Such financial modeling tools provide such functions as time series analysis and forecasting, econometrics forecasting and risk management. The leading edge products involve a variety of artificial intelligence technologies such as neural network or "fuzzy logic."

Generally, such programs are more attuned to users that work with mathematical models. Financial services is a particular market where there continues to be a strong demand for the more exotic financial modeling tools.

Executive Information Systems (EIS) are decision support tools which have been programmed for particular types of data access and report generation. They are designed to enhance access and manipulation of corporate data by prestructuring report formats on information within various relational database throughout a corporation. Many of the generic decision support financial modeling software products have been changed to include more the structured reporting model of an EIS.

In the past, the most sophisticated modeling programs were mainframe-based, primarily for access to the processing power required by the application. Many financial modeling applications still function best in the mainframe environment, but the growing power and cost-effectiveness of workstation/PC platforms has encouraged application migration to the micro environment. However, for the more sophisticated user, who creates models with complex modeling languages and multiple databases, the cost-benefits can be significant for the more expensive applications software packages, which easily integrate these various elements.

Vendors–Two of the larger vendors of financial modeling software are Information Resources and A. C. Nielsen. address the consumer packaged goods manufacturers, retailers and pharmaceutical vendors with decision-support tools.

Both companies maintain very large computerized proprietary databases and offer decision support and EIS analytical tools for marketing, sales,

planning and financial operations. The tools are usually designed for multi-dimensional views of the proprietary structure of the companies' data models.

Financial Coverstory from Information Resources, introduced in 1992, represents a new generation of financial modeling tools. Based on expert systems technology that also enhances ease of use, the program automatically identifies variances in financial data and provides explanations for underlying causal factors on analytical inquiries. One of the newer decision support products from A.C. Nielsen is *Opportunity Explorer and Promotion Simulator* expert-system software that analyzes historical actions that affect product sales and simulates the impact of future promote strategies.

Another major vendor in the financial modeling market is Computer Associates. Its CA-STRATAGEM Business Decision Software is used for decision support applications such as budget analysis and sales and forecasting. The combination of CA-SuperCalc and CA-SRATAGEM, provides a mainframe-to-midrange-to-micro corporate planning environment which CA defines as its Business Decision Software (BDS). BDS provides an integrated, comprehensive decision support software solution that includes the ability to access and consolidate data from multiple sources and use a number of statistical modeling functions to analyze the data. Based on a 4GL programming language, the product can also be customized for an EIS solution.

Some of the more innovative decision support products from smaller vendors that can be used for financial modeling type applications, include:

- *The Fuzzy Decision Maker for Windows* from Fuzzy Systems Engineering and produced in conjunction with Fuzzy Logic, Inc. provides an intuitive interface for capturing subjective judgments in making complex decisions involving various constraints, goals and alternatives.

- *Fuzzy Systems Professional* from Neuralware, Inc. uses fuzzy logic for addressing risk assessment and market share analysis. It is an approximate reasoning system that uses fuzzy sets, hedges, rules and the decomposition of variables into fuzzy regions.

- *Logical Decisions for Windows* from Logical Decisions allows for the handling of an unlimited number of alternative, evaluation measures, and goals with different weights that aid in achieving logically derived conclusions for a variety of problems.

Financial modeling is one segment of the decision support market. The broad-based decision support market consists of nonspecific report

generation, data access tools that provide user access to databases throughout a corporation. The market for such tools has been fueled in recent years by the wide-spread adoption of RDBMS that greatly enhance the ability of the nonprogrammer to generate meaningful reports from such database architectures.

A major new market opportunity for vendors of decision support tools is the enterprise warehouse database solutions market. These tools help aggregate separate tables of data for decision support users and download such information to a separate data warehouse facility to be used by decision support users. This reduces contention between OLTP and decision support applications in the same database environment.

Another major area of growth in decision support tools are visually-oriented data access and report generation tools for desktop users from a variety of corporate database environments. With the additional object-oriented (visual application development tools), these could also greatly increase the efficiencies of application development for the desktop and other departmental type users.

A particular niche-based segment of the nonfinancial modeling decision support market that is showing particularly strong growth is the PC-based expert systems decision support product used for help desk customer support.

c. Executive Information Systems (EIS)

EIS is a specialized version of a decision support system, which is programmed to solve problems for particular functions of corporate management users.

EIS has been around for many years and has enjoyed varying degrees of popularity. In the past, a significant limitation was a lack of computer literacy at the executive level. In general, this is no longer a problem as more managers and senior staff are coming to regard their PC, workstation or terminal as an integral part of their personal productivity assets.

Because all levels of management are now using such tools, some consider the acronym EIS to now stand for *enterprise information systems*, while others regard the E to mean *everyone*.

Today's systems typically include a database, a set of maintenance tools, transfer protocols, some form of analytic processor and a user-friendly interface. It is used for project reviews, budgeting, strategic planning and various levels of management report.

EIS Operating Environment–Originally, mainframe-based, most EIS applications have moved into the micro environment for improved response times and reduced costs. This does not mean that legacy mainframe-based EIS systems will disappear–there will still be a market for mainframe-based EIS applications that address very large, complex databases which reside on the mainframe. However, the growing proliferation of client/server architectures, and the steadily improving price-performance of PCs and workstations are creating a new EIS environment that uses these building blocks. Such environments are inherently easier to tailor to the specific information needs of managerial subsets and are expected to steadily grow in popularity, eventually eroding the current population of mainframe-based systems.

Costs–The original EIS programs ran only on mainframes and cost in excess of $100,000. Today, LAN-based servers provide the same support for less $20,000, and more-limited PC-based EIS applications cost less than $1,000.

A major vendor in the EIS market is SAS Institute, Inc. The company's products represent leading trends in its market. SAS Institute has emphasized enterprise-wide data access and product customization capability.

Most recent SAS product attributes include: a variety of data visualization technologies, including multimedia interfaces with digitized images and animated multidimensional objects. The intent is to expand EIS use from the original high-level executive audience to all levels of an organization. The acceleration in workstation processing speed and power and decrease in costs makes data visualization tools increasingly more accessible.

SAS/SPECTRAVIEW software enables users to create, analyze and modify graphical models representing multidimensional data. Through an interactive, menu-driven interface, users can create models of volumes, isometric surfaces and cutting planes to visually explore data. This program is designed especially for identifying and analyzing trends and relationships in large amounts of data. It is also designed to address more specially the scientifically-oriented user.

SAS Institute also addresses particular EIS needs of various industry-specific markets. For example, in the health care field of clinical analysis, SAS data analysis and applications development tools provide in addition to descriptive and inferential statistical analysis, the ability to work with advanced probabilities logic, expert system and artificial intelligence application development.

Other leading EIS vendors are Comshare, a pioneer in the industry with its Commander product, and Information Resources that specifically addresses the EIS market with its Software Express/IS product which allows for multidimensional, and multidepartmental data access and manipulation.

Generally EIS vendors are targeting several functional types of decision support users within the corporation with enhanced ease of use and support for a breadth of desktop platforms in client/server solutions.

Also vendors recognize that in the earlier versions of EIS targeted for senior management, a lot of the value of the solutions went unused. As a result, vendors have been working to broaden the customer base with specialized products for various types of users as well as enhanced ease of use features. Also, there is much more linkage capability through use of Dynamic Data Exchange and Object Linking and Embedding to other types of planning and analysis tools and applications, such as spreadsheets.

Another product direction is the integration of EIS modules within more comprehensive vertical or cross-industry application software products. Companies providing financial systems software, for example, are some of the trend leaders in such applications. The changes in EIS products to cover a broader range of decision support needs has caused a revitalization in market growth for EIS products in recent years.

A significant new market opportunity for EIS and other types of decision support vendors could be the data warehouse platform solution. As alternative approaches to data access methodologies continues to multiply, a major contest could develop between vendors of PC-based general data access reporting tools along with 4GL middleware suppliers and companies that provide data warehouse platforms for preprocessing desktop user information, which could be more in the domain of EIS and other decision support vendors.

d. Spreadsheets

New Features–Many of the most successful spreadsheets now offer import/export capability, in recognition of the fact that users may work with other spreadsheets and increasingly with a variety of broader applications and/or modular enhancements.

Odyssey Computing's On Schedule for Windows personal information manager, for example, is organized around a spreadsheet metaphor. A number of software companies, including CA, Lotus and Lucid are now offering multidimensional spreadsheets.

Other significant changes have been in ease of use and an increasing number of built-in functions, including: data-modeling tools for working with data with more than two variables, publishing tools, statistical analysis, presentation-quality charting, drag-and-drop capabilities, and Wizards for enhancing on-line support. Also Lotus 1-2-3 for Windows is optimized to work with Lotus Notes and Excel 5.0 and Quattro Pro 5.0 also provide workgroup support.

C
Market Forecast

1. Overview

Planning and analysis solutions are delivered primarily via applications software products and transaction processing services. More than 90% of this cross-industry sector's expenditures are for applications software products.

Planning and analysis application software products compete with each other and with other categories of applications software products in the following ways:

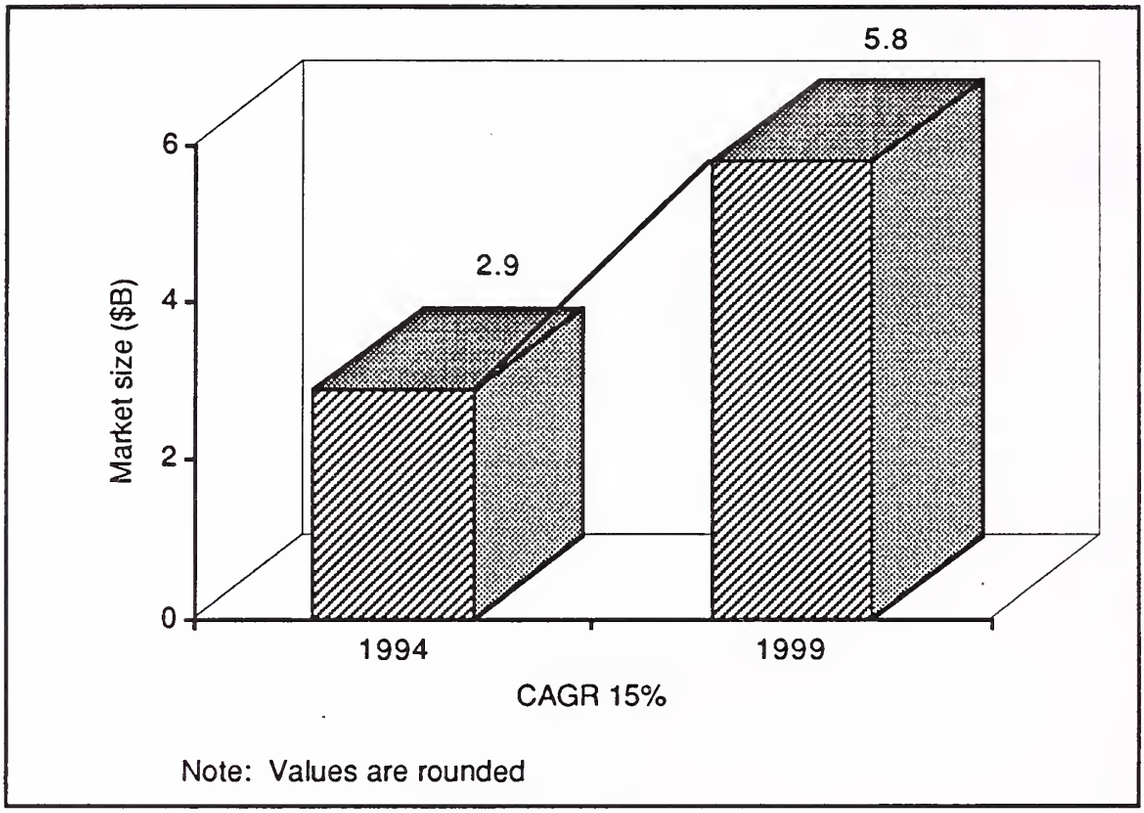
- The market for self-contained, low-end financial modeling products has been eroded by spreadsheets and financial modeling characteristics that have been built into applications such as spreadsheets, accounting applications software or sales and marketing software products.
- Low-end project management software competes with office automation calendaring and scheduling applications software products.
- Multidimensional spreadsheets have taken on many of the qualities of an EIS or an EIS development tool and therefore take away from sales of what might be termed a separate EIS application software product.

Turnkey systems vendors of planning and analysis solutions, particularly in the EIS sector, have been negatively affected in recent years by the transition to general purpose personal computers and workstations on the desktop. Over the years the primary product/service market for EIS systems has shifted from turnkey systems to an applications software solution.

The size and compound annual growth rate (CAGR) of the U.S. planning and analysis cross-industry information services market from 1994 to 1999 is noted in Exhibit VII-1.

Exhibit VII-1

U. S. Planning and Analysis Cross-industry Sector Information Services Market, 1994-1999



1994 revenues for this market totaled approximately $2.9 billion and are expected to grow at a 15% compound annual growth rate to $5.8 billion in 1999. The 2% downward revision in 5-year growth rate outlook from 1993 for this market reflects primarily pricing pressures in the PC/workstation packaged software area with dramatic drops in hardware prices in these platforms over the past year. However, INPUT believes this cross-industry segment will be one of the stronger growth application software product markets, particularly in unit sales. These products are used to increase productivity of nearly all functional areas of a corporation, including budgeting, procurement sales marketing, and production. Ease of use of the tools is also expanding their acceptance rate throughout the corporation.

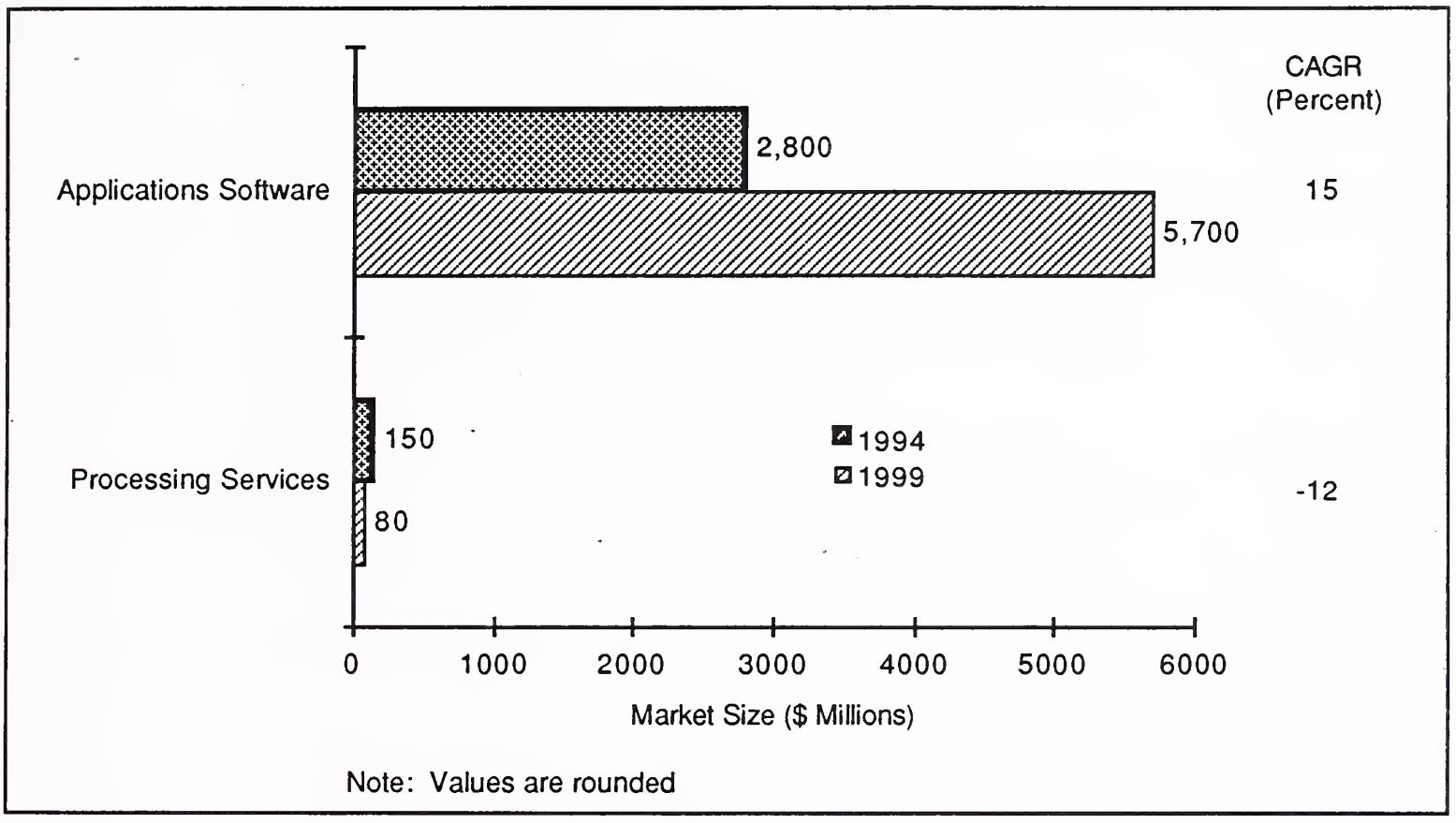
Also, there is a strong motivation for U.S. businesses in the highly competitive global market to improve productivity, sales and profitability—all, fundamentally the end results of planning and analysis.

2. Product/Service Market Analysis

Exhibit VII-2 shows the planning and analysis cross-industry sector market growth by product/service market.

Exhibit VII-2

U.S. Planning and Analysis Cross-industry Sector Information Services Market by Product/Service Market, 1994-1999



Note: Values are rounded

a. Applications Software

Applications software products dominate the size and growth rate of the planning and analysis market. This market sector is forecast to grow at a compound annual rate of 15%, from approximately $2.9 billion in 1994 to close to $5.8 billion in 1992. This reflects the strong and continuing interest in planning and analysis software as a viable business tool, the improvements in ease of use, the expansion in number of specific applications, and the cost-effectiveness of the workstation/PC computing environment.

b. Processing Services

In preworkstation/PC days, transaction processing services, such as time-sharing or remote batch, offered the business planner or analyst a computing resource that was more responsive to needs than many

in-house data processing departments. In addition, costs were proportionate to use, response (job turnaround) was negotiable (for a fee), and the vendor frequently provided sophisticated applications software not easily accessed or obtained elsewhere.

The global population of low-cost workstations and PCs, however, and the growing availability of reasonably priced planning and analysis applications software, has had a dramatic effect on this product/service market. Over the past few years, more and more users have off-loaded their transaction processing applications to the microcomputer (or in some cases, mainframe or minicomputer) platforms. The acceleration in the acceptance of client/server applications will continue this steady migration.

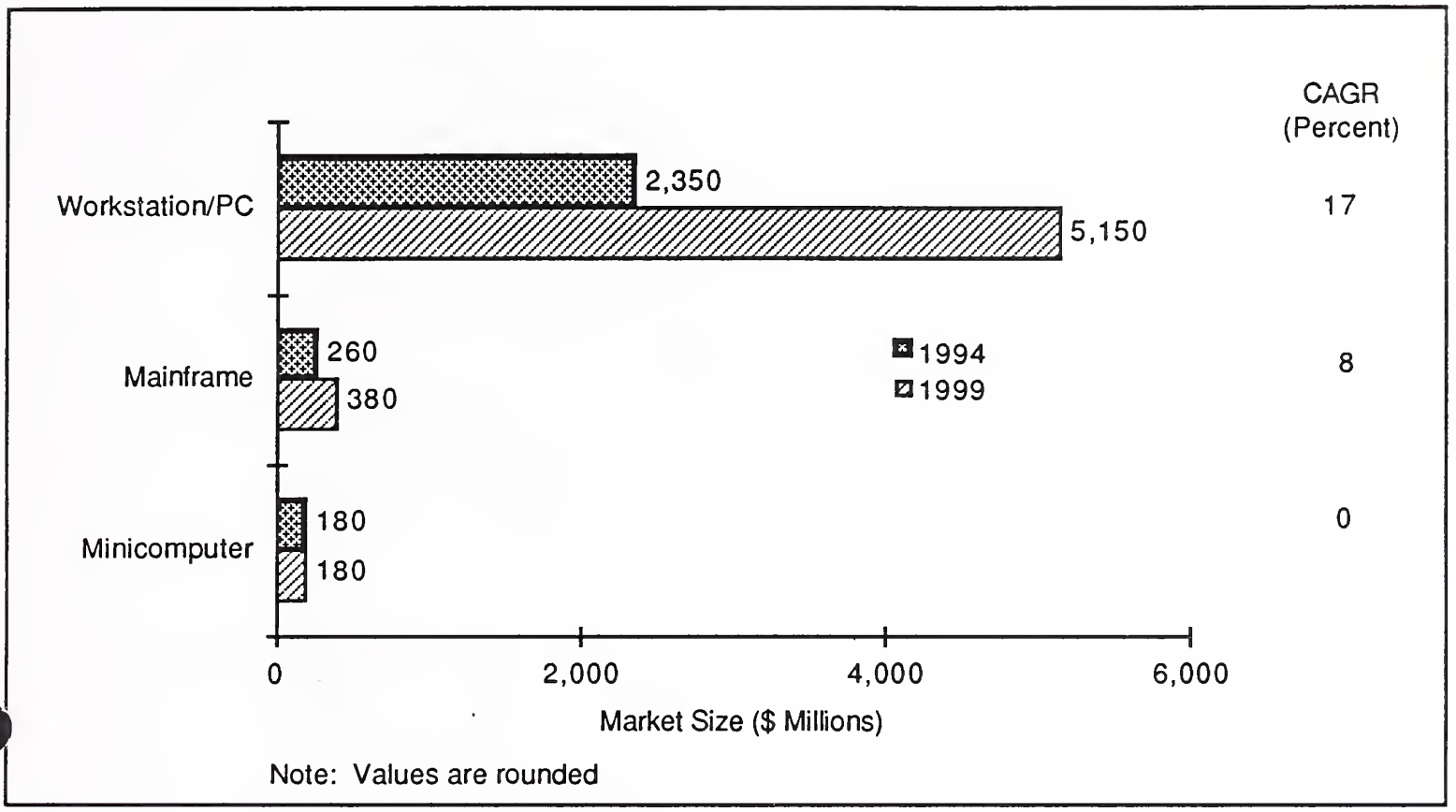
INPUT estimates the 1994 market for processing services at $150 million, down 9% from $165 million in 1993. Annual revenues are forecast to decrease further to less than $80 million by 1999, at a compound annual rate of -12%.

3. Platform Analysis

Exhibit VII-3 summarizes projected 1994-1999 applications software revenues by delivery platform.

Exhibit VII-3

Planning and Analysis Cross-industry Sector Applications Software Market by Delivery Platform, 1994-1999



Note: Values are rounded

Workstations/PCs–As noted earlier, the planning and analysis market is essentially driven by the growth in sales of applications software for workstations/PCs. In 1994, expenditures for applications software using these platforms is forecast to be about $2.4 billion. This reflects primarily the expansion in types of applications for planning and analysis in the corporate environment with the ease of use of GUI-based desktop applications.

Mainframes–Mainframes will continue to be a repository for large, complex databases. For many large applications they are still the only logical platform, and in a client/server environment they have the resources and connectivity to function as an enterprisewide server. INPUT forecasts that 1994 applications software revenues for this platform will be $255 million and believes there will be continuing growth in complex enterprise planning activities that are best suited to a mainframe platform.

In particular, the central database server, based on a MPP architecture is expected to greatly improve the price/performance of mainframe level database platforms.

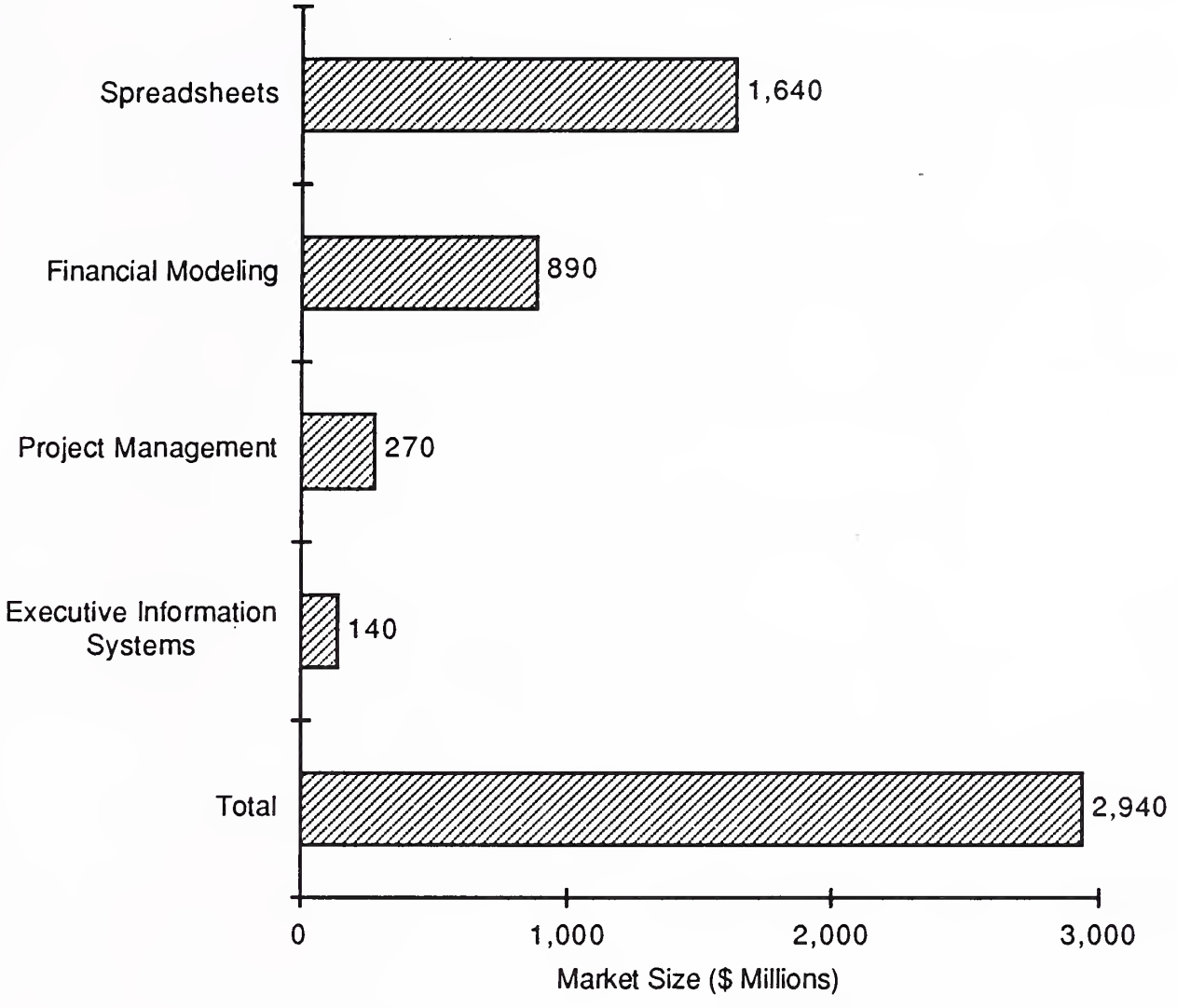
Minicomputers–INPUT estimates 1994 for minicomputer-based applications software at $180 million, essentially representing 0% growth from 1993. Planning and applications software does not have a strong midsized platform orientation, and although there will always be some applications that function best in that environment, the server-enhanced workstation/PC platform is expected to function as the principal departmental database server of the future.

4. Applications Expenditures

INPUT's estimates of 1994 planning and analysis expenditures by application area are summarized in Exhibit VII-4.

Exhibit VII-4

U.S. Planning and Analysis Cross-industry Sector Market Size by Application Area, 1994



Note: Values are rounded

Spreadsheets–Of the $2.9 billion in 1994 expenditures on cross-industry planning and analysis information services resources, INPUT estimates that $1.6 billion, or 56% is for spreadsheet applications–including worksheets, presentation modules and macro generators. This represents a 17% growth rate during 1993. Over the next five years, the growth rate in spreadsheets is expected to moderate to a 12% annual growth rate, which primarily reflects market maturity.

Financial Modeling–Approximately $890 million will be spent on financial modeling and planning information services in 1994. This represents a

19% growth rate over 1993. These expenditures include dollars spent for the total generic decision support tools market, which include tools for providing time-series analysis and forecasting, econometrics forecasting, and risk management.

Project Management–Approximately $270 million, or 9% of the total 1994 planning and analysis expenditures will be for project management applications. INPUT estimates that project management will represent the fastest growing planning and analysis market, with a projected five-year CAGR of 20%. This reflects the expansion in the number of uses for project management within the corporate environment related in large part to re-engineering implementations, along with improving ease of use and the dramatic decrease in cost of project management software in recent years with the migration to client/server platform architectures. In addition, project management software is increasingly being incorporated into the fast-growing workgroup applications software area.

Executive Information Systems–1994 expenditures of EIS are projected at $140 million. This represents an increase of approximately 17% over 1993 revenues. The growth rate for EIS will likely remain in this area over the next five-years as these systems become available for multiple layers of management, rather than the original executive level market target. Also, the more recent targeting of EIS solutions for specific vertical markets also increases the market size potential.

D
Conclusions and Recommendations

1. Conclusions

- The U.S. Planning and Analysis Industry is a major beneficiary of the corporate re-engineering movement. Planning and Analysis applications can be used to assess current work processes as well as to implement more efficient work group approaches to enhance departmental and corporate wide operational integration.

- These applications complement the trend to creating relational database structures to improve the ease of access to data by multiple levels of corporate decision makers.

- Project management applications are expected to be the fastest growing sub-sector of this Planning and Analysis Market. The cost and ease of use of newer project management applications plus their changing function as to a more general purpose work group management solution will accelerate growth in this area.

2. Recommendations

- Companies providing applications solutions should incorporate planning and analysis as modules elements of more general industry-specific applications.
- Work with object oriented *de facto* standards to increase the inter-operability of planning and analysis applications and emphasize value-added enhancements to current products with market share leadership.
- Establish partnerships with vendors with products in a particular planning and analysis subsector to provide enhanced product benefits.

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Sales and Marketing

A
Industry Definition

Sales and marketing information services include the following applications areas and activities:

- *Sales Productivity Aids*–These activities include list processing, creating form letters, contact management, tracking and forwarding leads, ranking prospects, monitoring lengthy sales cycles and the creation and use of prompting scripts for telemarketing.

- *Sales Analysis*–Activities include the creation and analysis of monthly history and sales summary files, analysis of invoice details, tracking of sales month-to-date or year-to-date and the analysis of sales by branch, sales territory, customer and product.

- *Marketing Management*–The primary activity is the generation and analysis of reports tailored to specific management requirements. These reports address such areas as marketing, sales and product strategies; designing and managing sales territories; and analyzing marketing and sales programs by market, territory, product, customer type, price, and channel. Sales and marketing management software is often closely integrated with financial planning and decision support functions.

- *Demographic Market Planning Models*–These models are used for selecting the (geographic) location of stores, outlets, and companies. The basic model cuts across multiple industries but may require customization for some business areas such as petroleum, banking, government services, restaurants, general merchandise, and supermarkets.

Geographic information systems(GIS), offer graphically-oriented census tract information from the most recent U.S. Census; this captures a tremendous amount of information on consumer demographics, and is a

potentially powerful marketing tool for enterprises targeting consumers as buyers. The tapes themselves are available at minimal charge from the U.S. Department of Commerce. Processing the data is no small task, and a number of information services firms offer access to the data, at commercial prices, using custom-designed selection and analysis programs.

Unlike some of the other cross-industry sectors—such as human resources—from a functional standpoint, all marketing and sales systems are not alike. Beyond the basic functions of storing data for mailings and list processing, additional functions and features vary widely. This diversity reflects the relative immaturity of marketing and sales application solutions. These activities are often closely integrated with accounting, inventory control, purchasing and order-entry software. Products range from standalone personal productivity tools to LAN-based multiuser systems and to host-based systems.

A major portion of marketing and sales software is industry-specific and is, therefore, not considered in the user expenditure forecasts for this cross-industry sector. Vertical-industry sectors with emphasis on the selling and distribution functions—such as wholesale distribution, retail distribution, and manufacturing industries—are the most active users of marketing and sales software. Examples of specific applications include hotel and airline reservations systems, which are fully customized for their specific markets.

B
Key Trends and Issues

1. Background

Marketing and sales applications are a natural complement to other cross-industry packages such as accounting and office systems. They are also a natural addition to vertically-focused packages such as inventory control and purchasing, which are used predominantly in the manufacturing, retail and wholesale distribution, and packaged consumer goods industries.

Sales and marketing attributes and functions are often incorporated into other cross-industry applications software products as an add-on module. Thus, companies that sell sales and marketing cross-industry sector applications software products are likely to sell other products as well.

For marketing and sales applications, ease of customization is particularly important to accommodate user variation in methods of managing and

tracking data and company-specific forms and documents. Ease of integration with other applications and databases will continue to be an important selling point for both application areas.

The balance of this chapter examines the forces driving this cross-industry market segment.

2. Trends and Events

This section notes the trends and events that are affecting the sales and marketing cross-industry information services marketplace.

a. Customer Satisfaction and Contact Management

Total Quality Management Principles (TQMP), customer service, quality, and customer satisfaction are some of the many terms now used to describe the U.S. industry's growing concern for the quality of its products and services, and its desire to satisfy customer requirements at all levels. Driven by the realities of a global marketplace (increased foreign competition), and the recognition that good service supporting good products is good business, most firms are now paying close attention to all aspects of customer relations.

The sales staff is the primary point of contact with clients and prospects, and many new sales tools have been developed to record, track, and act upon such external interactions. In addition, some companies now track all external contacts, not just sales-related clients and prospects. The need to assure a high level of quality and service is the primary motivator for such close contact tracking. The intent is to be certain that clients, prospects, and others receive prompt and satisfactory responses to their needs. IS technology, especially sophisticated sales and marketing contact management programs, allows such data to be easily recorded and accessed by interested parties at all levels within the enterprise.

b. Sales Force Automation (SFA)

Sales force automation has now become almost a standard business requirement. Effective account and territory management (or management of a sales or marketing group) requires time, careful planning, and the optimum use of resources.

Using SFA tools such as laptop computers, applications software, and modems, contact management and sales productivity can be dramatically improved, and a steadily increasing population of salespersons and sales managers now recognize this and are embracing the SFA concept and using SFA resources.

However, implementing an effective SFA program is a complex process and requires careful planning, the support of top management, a clear definition of information needs, a concern for "people" issues, a thorough pilot or beta test to identify problem areas, and strong training and support programs. Sales groups are also finding that automating an existing, but flawed, system creates more problems than it solves. Regardless of these caveats, however, sales force automation is here to stay.

c. Laptops

Truly portable computing is a new reality in field sales activity. The new generation of laptop or portfolio computers are:

- *Light*–Five pounds or less
- *Full-featured*–Most portables have all the capabilities of desktop machines
- *Low-cost*–Less than $2,000 for a fully-equipped monochrome machine
- *Easy to Use*–Most come preloaded with a sophisticated graphic user interfaces (GUI), such as Microsoft's *Windows* that facilitate user interaction with many applications programs
- *Easy to View*–They have excellent monochrome, marginal passive matrix color and superb active matrix color screens that rival the viewing quality of desktop units
- *Excellent "Road Warriors"*–As coined by a major personal computing journal, a *road warrior* is a portable computer with the ability to perform most office tasks in the field. These tasks include such technical functions as faxing and data transmission and can use specialized modem cards and integrated connections. Business activities for which these resources can be used include such standard sales and marketing functions as proposal preparation, pricing, word processing, account tracking and updates to forecast databases.

As a result of this technology, the field sales force and sales management now have a powerful tool to facilitate the sales process and sales administration and accounting. A recent INPUT survey of the insurance industry noted that a growing percentage of insurance agents see their portable computers as powerful tools that display prospect-specific data in tabular and graphic form in the prospect's home. The respondents noted that where sales were closed during the sales call, the majority were facilitated by the use of a portable computer.

As color screens become cheaper, INPUT expects to see an increasing number of graphics-intensive sales application programs used by a growing population of computer-literate salespeople and sales management. As magazines and television have known for years—color sells. It can simplify and clarify complex concepts, and easily identify key points and issues. Laptops and portfolios with bright (active-matrix) color screens will become key sales tools.

d. Telemarketing

Telemarketing is generally recognized as the fastest-growing marketing channel and should be receiving the most attention during the balance of this decade. Telemarketing offers the key attributes of cost-effectiveness and productivity and is most effective when used in conjunction with other sales programs.

As with other sales activities, telemarketing has benefited from the application of computer and telecommunications technology, and the concepts and principals of sales force automation are being effectively applied to this sales channel. A broad range of applications programs for such functions as contact management, lead tracking, and automated literature distribution, including fax-on-demand, are now aimed specifically at the telemarketing department.

In a hyper-competitive economy, concerns for profitability drive increases in business efficiency, and sales cost reduction is motivating many businesses to consider alternative channels, such as value-added resellers, distributors, catalog sales and telemarketing.

e. Core Applications

From the simple name, address list and paperwork automation programs of the 1970s and early 1980s, sales and marketing applications software now can encompass the total sales function, and is frequently linked to most other major corporate activities. In addition to sales implementations of word processing, spreadsheet and E-mail programs, sales and marketing applications software now includes programs dealing with contact management, call history and reporting, territory management, sales forecasting, lead tracking and proposal generation.

Other sales and marketing applications software supports marketing, scheduling and time management, pricing, sales presentations, sales and marketing analyses and such ubiquitous housekeeping activities as inquiry and order entry and expense reporting. These applications are common to most sales force automation programs and, in addition, other corporate information systems activities, such as executive information

systems (EIS), also have access to the sales and marketing database and records.

From this cornucopia of sales and marketing applications, three-core applications typically form the foundation for a sales force automation program—database management, account management and, in a growing number of firms, electronic commerce or electronic data interchange (EDI). EDI, especially, is an area of opportunity, as a growing number of firms recognize the benefits of a structured interchange of business data and either impose an EDI relationship on suppliers, or respond to EDI requirements from customers.

f. Pricing

The price of sales and marketing applications software has dropped significantly, just as the size of the platform on which it runs has become smaller and less costly, and this trend shows every indication of continuing. One estimate of the market for sales and marketing software notes that of approximately 600 multiuser applications software packages considered, one-quarter cost less than $1,500, about one-fifth cost more than $10,000, and the prices of the balance fell somewhere between $1,500 and $10,000. These prices are for standard applications and in a PC environment will typically run under DOS. Improved functionality or product versions for other operating environments, such as UNIX, will generally cost more. Single-user versions of many of these software products are generally less expensive, but have limited ability to function in a corporatewide sales force automation, information exchange environment.

Sales and marketing software can either be off-the-shelf (*shrink-wrapped*) or customized by the vendor to meet specific company needs. *Shrink-wrapped* software is generally going to be less expensive, but for a sales force with many users, the customer will pay for either a multiuser product version or multiple copies of a single-user version. Many vendor packages are now easily modified and scalable; that is, can be sized to run in different operating environments and on different platforms. In some cases, modifications are applied by the user as installation parameters–in others, the vendor modifies the software for the user.

In most cases, although low-price software packages are available, they generally lack what most larger users consider to be necessary capabilities—e.g. relational databases. Prices for single-user sales and marketing packages can be less than $100, but although useful to a single salesperson or in a simple sales environment, such packages are not normally used in a corporate sales force automation program.

Finally, although price is important, function is critical, and buyers have typically placed their emphasis first on getting needed function and then on price. For most firms, a sales force automation program will be more expensive than manual methods (e.g., requires new hardware, software and telecommunications expenditures), but this increase will be more than offset by increased sales and productivity and better and more timely accountability.

g. Linkages to Other Applications

The core applications for sales and marketing systems were described in section 2E. But there are other important linkages being provided to word processing programs and workgroup software such as Lotus Notes. The importance of these linkages is as a productivity enhancement, helping the sales function to more effectively complete its tasks, and communicate in real-time internally and externally during the sales cycle.

h. Enterprise-wide Systems

As sales and marketing software products prove themselves in division and unit environments, this success has generated momentum toward enterprise-wide sales and marketing systems, integrating multiple sales unit information into a single database of customer contacts, and sales tracking and support information. This is a phenomenon that is relatively new and has high potential for vendors who can provide the software flexibility and integration skills to deliver such capability.

i. International Expansion

As in most other industry or cross-industry sectors, opportunities for growth outside the U.S. offer an attractive alternative, or complement, to the very competitive and relatively mature U.S. market. (Only in the world of information technology could a fifteen-year history be considered "mature".) While the European recession caused major problems in information services growth abroad, the picture is brightening in the U.K. and will gradually turn around on the continent.

The fastest growth in sales and marketing software products will occur in Asia and Latin America, which are newer, less penetrated markets. In Asia especially, economic conditions seem to support significant information services growth. But language of documentation, barriers to direct entry and a lack of sophistication to absorb complex software products must all be considered before commitments are made to enter foreign markets.

j. Consulting Services

As software complexity grows, and users' requirements for fully-integrated solutions also become more popular, the market for professional services will also move ahead in healthy fashion. While INPUT does not track professional services in cross-industry markets (they are forecast as a part of the vertical market identity of the buyer), it is important for software providers to realize that additional revenue streams, profits and competitive advantage will come through the capability of delivering professional services. Custom programming, systems design and integration, training and implementation services will all place the providing vendor in a stronger position. Some leaders in the sales and marketing software business are now reporting professional services growth in the range of 100% per year.

The major sales and marketing trends and events are summarized in Exhibit VIII-1.

Exhibit VIII-1

Sales and Marketing Cross-industry Sector
Major Trends and Events

- Customer satisfaction and contact management
- Sales force automation (SFA)
- Use of portable computing (laptops)
- Telemarketing
- Sophisticated core applications
- Reduced software pricing
- Linkages to other applications
- Enterprise-wide solutions
- International expansion
- Consulting/professional services opportunities

3. Issues

This section notes issues of concern to the sales and marketing cross-industry sector.

a. Are Sales Forces Necessary?

This question revolves around the timely congruence of *Just in Time* (JIT) production techniques, focused advertising, telemarketing, timely and cheap overnight delivery services, direct sales by the manufacturer,

growing catalog sales, and video sales (such as QVC). For the business and individual users, these sales channels are typically supported by liberal vendor return, exchange and service policies, and strong product guarantees. Given the user acceptances of such sales and marketing techniques, is there really any longer a need for a face-to-face sales force?

The simplest counter to the *no sales force* position is the argument that consumer (and virtually all other) products are not bought, they are *sold*. This viewpoint holds that all products of real value that satisfy real needs (and cost *real* money) will have competent competitors whose offerings will have slight variations in function, feature and price. Such differences are not easily analyzed and evaluated by a user with limited access to counsel and guidance. A vendor that does not offer experienced and competent sales assistance, especially if competitive products offer such support (usually in the form of a sales staff which makes direct contact with the prospect), will be at a competitive disadvantage.

Countering the arguments for a large, structured sales force, however, is the success of such firms as Dell Computer Corporation or Wal-Mart. These two firms demonstrate the effectiveness of JIT retailing—a process that eliminates the need for a large sales force or costly middlemen. Another example of innovative retailing is the use of computer-based shopping services. On-line computer shopping services' sales grew to more than $800 million in 1993, and subscribers to such services have grown six fold since 1987. This market will grow even more as a result of such facilitators as *Prodigy, America On-Line and Compuserve* and the increasing computer literacy of businesses and individuals. Although almost all critics of unnecessary sales middlemen agree that *some* outside sales force is necessary, many feel that it will eventually be limited to retail sales and sales support for complex and sophisticated business products.

INPUT, in its report on the *Wholesale Distribution Market Sector*, notes a strong trend toward bypassing the traditional wholesale function and supports the hypothesis that the wholesale market is diminishing in size—a trend that will continue unless there is a dramatic change in the way products will be sold in the future. INPUT believes there will always be some requirement for wholesale sales, but such needs will diminish in the highly efficient global marketplace of the future. Retail sales (and sales people) will certainly be affected by alternative sales channels, but there will always be some need for businesses and individuals to deal directly with a knowledgeable sales person, especially for the sale of high-cost, complex or highly specialized equipment and services. Finally, there is the American buyer's traditional need to "kick the tires" and ask questions—activities best conducted in a face-to-face environment.

b. Sales Force Computer Literacy

Traditional sales forces have, until recently, been reluctant to embrace computer technology. They either lack computer literacy or feel that personal contact is the most important sales tool . The computer literacy issue can be addressed through proper motivation and training, and the demonstrated benefits of Sales Force Automation (SFA) are so significant that, once understood, they are generally used and supported by sales and marketing staff at all levels. SFA promotes and facilitates structured and managed personal contact, and INPUT believes that those who use SFA will inevitably do better (that is, meet or exceed quotas) than those who do not. The reluctance to embrace SFA is similar to many airlines' reluctance to use yield management techniques in the early 1980s. This reluctance quickly disappeared as those who used yield management clearly achieved better load factors than those who did not. The same will hold true for those who use SFA programs and techniques. Significant issues are summarized in Exhibit VIII-2.

Exhibit VIII-2

Sales and Marketing Cross-industry Sector
Significant Sales and Marketing Issues

- The necessity for a sales force
- Sales force computer literacy

4. Technology

Although discussed in other sections of this chapter, technology, as a valuable sales and marketing resource, is worthy of a brief review and summation. For the technology-oriented sales force and marketing group, there is now a broad and rich selection of computer-oriented resources from which to draw. These resources include devices such as: pen-based computers; full-function, lightweight and portable computers such as laptops and portfolios; PCMCIA fax cards and modem cards to use on portable computers; platforms at all levels—mainframes, midsized (AS/400) and PCs; electronic books, manuals and catalogs; and personal digital assistants such as Apple's *Newton.*

Graphic user interfaces (GUIs) such as Microsoft's *Windows* facilitate the ease-of-use of such technology, and for the field sales force, these devices share the common and desirable characteristics of mobility, low cost and simplicity. A rich and varied selection of applications software products is available for use with these devices, and for those with special needs, user, vendor, and contract programmer software modifications are possible.

In other words, technology does not limit the applicability of computers and computing resources to sales and marketing activities and functions. The technology is already in place. All that remains is to use it effectively.

C
Information Services Market Forecast

1. Overview

This chapter provides the U.S. forecast for the sales and marketing cross-industry information services market sector. Total market and three product/service segment forecasts are offered.

INPUT defines cross-industry markets as being served by only the applications software, processing services and turnkey systems segments, since other product/service markets are only meaningful in an industry-specific context.

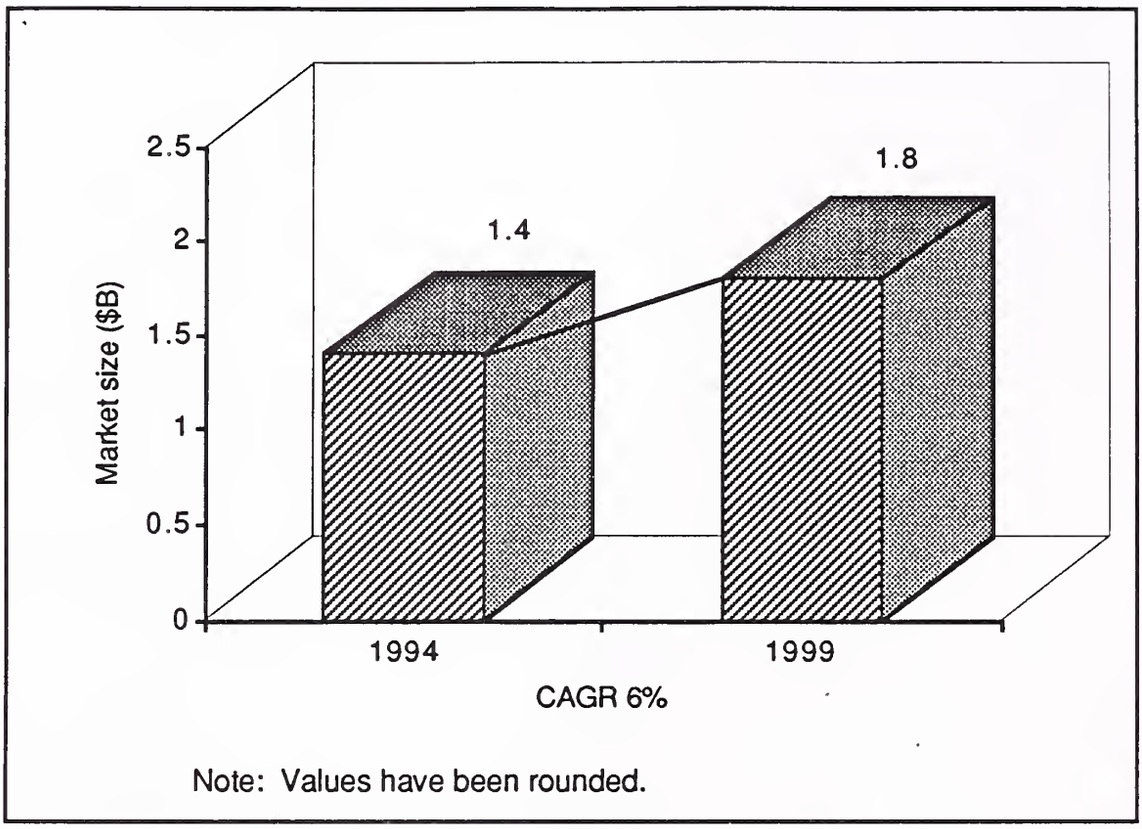
Note that values shown in the graphic exhibits in this chapter have been rounded for ease of reference. Actual values may be used in the text and are indicated in Appendix A, the *Forecast Database.*

2. Information Services Market

The size and compound annual growth rate (CAGR) of the sales and marketing cross-industry information services market from 1994 to 1999 is noted in Exhibit VIII-3.

Exhibit VIII-3

Sales and Marketing Cross-industry Sector Information Services Market, 1994-1999



Note: Values have been rounded.

INPUT forecasts total 1994 sales and marketing revenues to be nearly 1.4 billion, growing at a compound rate of 6% to $1.8 billion in 1999.

The five-year compound growth rate has been reduced from 7% in the 1993 report to 6% for the period 1994-1999, reflecting INPUT's belief that information services growth will continue at a steady pace in this marketplace, but will be constrained in the sales and marketing activities related to a diminishing wholesale distribution market and a growing number of industry-specific sales distribution channel alternatives.

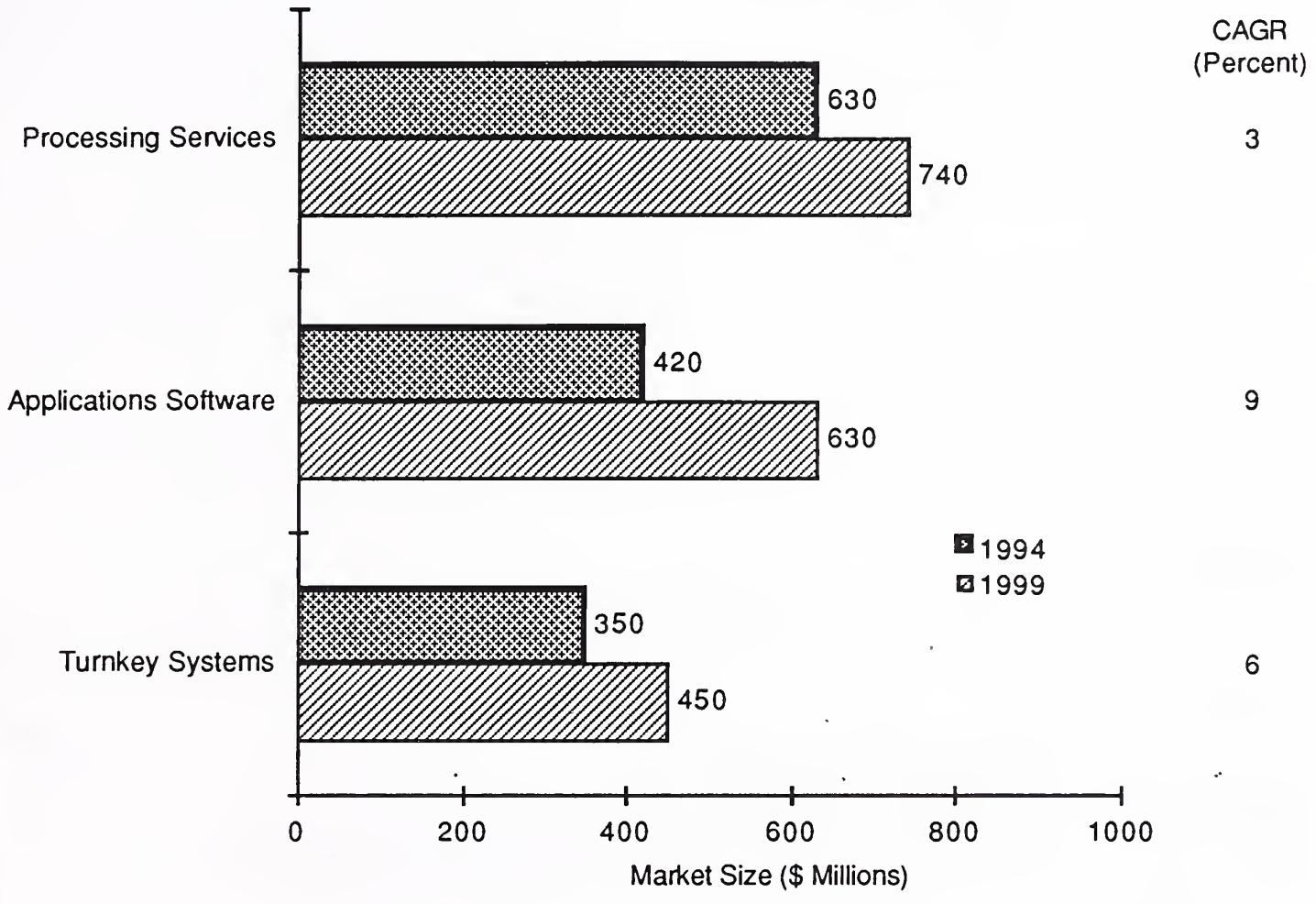
Also, continuing pressure on software product and equipment prices will keep average sales prices from significant increases.

3. Product/Service Category Analysis

Exhibit VIII-4 offers the sales and marketing cross-industry sector market growth by product/service segment.

Exhibit VIII-4

Sales and Marketing Cross-industry Sector Information Services Market by Product/Service Segment, 1994-1999



Note: Values have been rounded.

a. Processing Services

User expenditures for sales and marketing processing services are primarily for list processing and customer or prospect demographic data. A number of large national firms such as R. R. Donnelly and many smaller regional list-processing organizations serve this product/service market. Such information bases and the software that implements selection criteria are typically delivered by third parties as a cost-effective alternative to taking such functions in-house. In addition, many of the databases are proprietary—the product of comprehensive market research programs—and are not available for in-house use.

INPUT measured a modest 4% growth in 1993 expenditures for processing services. This growth will taper off slightly over the five-year forecast period, however, yielding a 3% 1994-1999 CAGR and expenditures of $735 million in 1999. The 3% CAGR, although modest,

reflects this industry's steady demand for processing services. This demand is notable in that many markets analyzed by INPUT are experiencing a leveling of the demand for processing services as this form of information services, so important in the 1970s and 1980s, sees market share migrating to other processing alternatives—for example, many of the tasks that used to be performed using general purpose timesharing networks are now being run on powerful workstations and PCs.

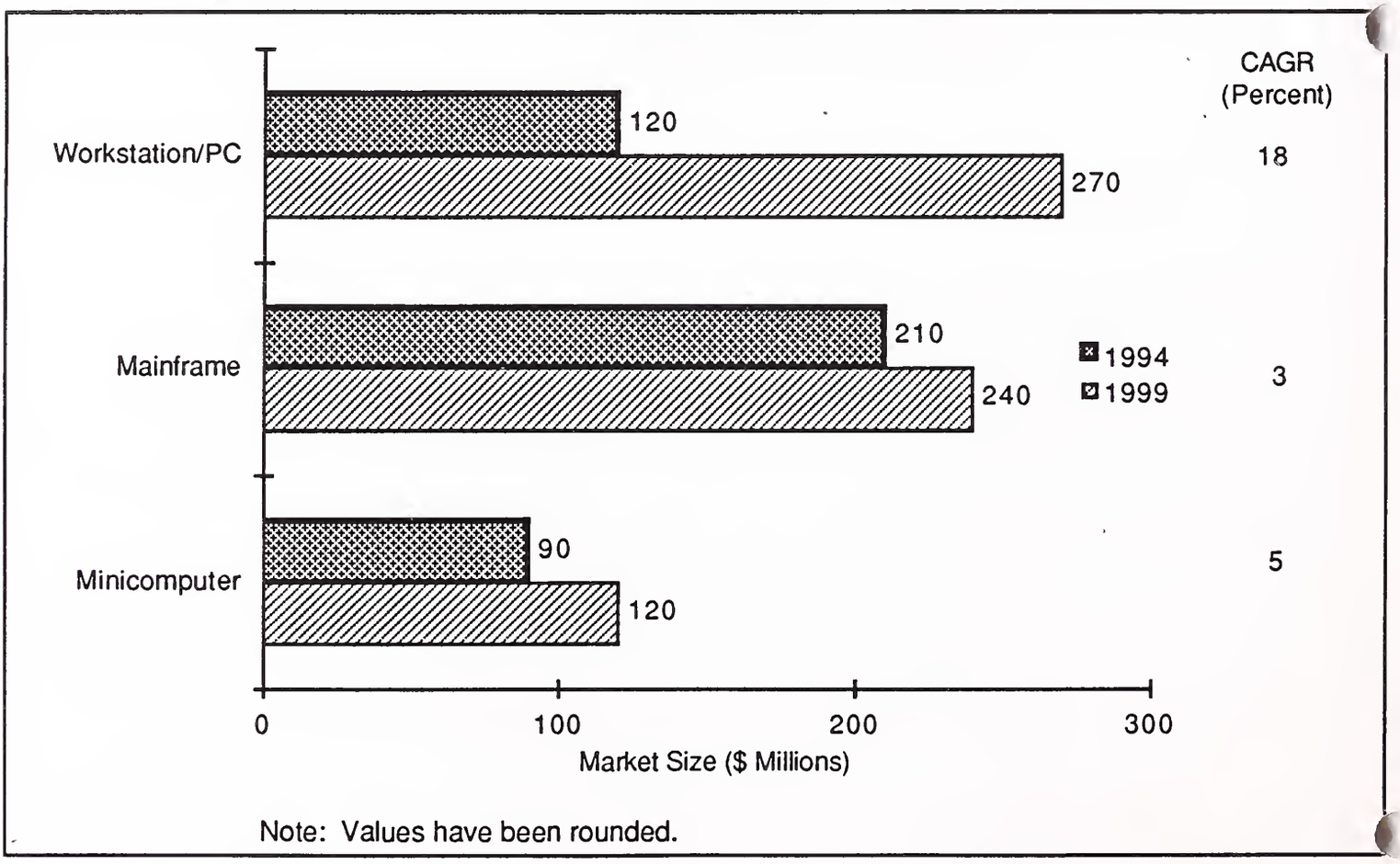
b. Applications Software

INPUT forecasts the sales and marketing cross-industry applications software market to grow 9%, to $420 million, in 1994. The five-year CAGR will be 9%, resulting in total user expenditures of almost $630 million in 1999.

Exhibit VIII-5 indicates how the user expenditures will be distributed among the three platform groupings—mainframes, minicomputers and workstation/PCs.

Exhibit VIII-5

Sales and Marketing Cross-industry Sector Applications Software Products Market by Platform, 1994-1999



Note: Values have been rounded.

Workstations/PC–Although five-year applications software growth, overall, is projected by INPUT at a respectable 9%, the most significant market increase will occur in products for the workstation/PC platform. User expenditures in this market are expected to grow at 18% over the forecast period, reflecting the strong and growing impact of the new generation of powerful, light, inexpensive and easy-to-use desktop and portable computers as well as related SFA products and devices. By 1999, expenditures for workstation/PCs applications software products will be greater for than for either mainframes or minicomputers.

It is interesting to speculate on the resources available to the sales staff of the 1990s. Such resources will almost certainly include: portable digital catalogs using CD-ROMs and color screens to display product lines and options; sales presentations with text and imbedded, modifiable graphics; cellular telephone access to such on-line databases as industry demographics or business credit ratings, with digital output to a laptop or portfolio computer; digital access (via fax or modem) using standard telephone linkages (e.g. a modular connection) or cellular access to a salesperson's company resources for order placement, inquiries, E-mail, etc.; personal digital assistants to monitor schedules; and pen-based units to digitally record contract signatures and enter orders.

Mainframe–Enterprise SFA programs, interwoven with other corporate programs such as accounting or inventory systems, will continue to function best in a mainframe environment. INPUT projects a growth of 3% in expenditures for mainframe applications software products, from 1994 to 1999. Business acquisitions and consolidations tend to ultimately reduce the number of large platforms and thus reduce hardware-dependent sales revenues and licensing fees. Most revenues are likely to come from upgrades to existing licenses and software maintenance fees.

Minicomputer–Minicomputer (e.g. IBM's AS/400) expenditures for sales and marketing cross-industry applications software will grow 7% from 1993 to 1994 to $90 million. Over the five-year period, 1994-1999, the growth is expected to decline slightly, to a 5% CAGR and yield a $120 market in 1999.

Many vendors in this platform category believe there is a low penetration of minicomputer sites for sales and marketing applications. In fact, one observation notes that of an estimated 70,000 AS/400 sites in the United States, only 1,000 have installed sales and marketing applications software. Such a low penetration of the most popular minicomputer platform is regarded by INPUT as a logical result of business conditions and not an indictment of either the platform or the application. As business conditions improve, products sales for this very large installed base will also improve, but many new solutions will be implemented on lower costs desktop units, not minicomputer.

c. Turnkey Systems

Turnkey systems expenditures for the sales and marketing cross-industry sector are forecast to grow at 6% in 1994. Over the five-year period, 1994-1999, the sales and marketing turnkey system expenditure CAGR of 6% is lower than the overall turnkey systems market that is driven by more dynamic industry-specific solutions.

It should be noted that although a substantial number of VARs provide integrated marketing and sales systems to specific industries, such as wholesale and retail distribution, far fewer provide cross-industry integrated marketing and sales systems. In general, the VARs supplying cross-industry software products deliver them on a variety of platforms and can provide customization and integration services. Although just-in-time (JIT) manufacturing techniques limit inventory requirements, a VAR still must stock a minimum number of platforms—a significant cost item.

D
Conclusions and Recommendations

1. Conclusions

- Sales and Marketing cross-industry information services growth will continue at an unspectacular but steady rate during the forecast period.
- Desktop software applications products (workstation and PC platforms) will produce most of the growth opportunities in this industry.
- Portable computing/communicating devices and software will extend the reach of sales and marketing solutions into many more remote sales applications and selling environments. To the extent that these tools achieve broad acceptance, the forecast U.S. growth rate of a 6% CAGR may be conservative.
- Demand will grow for more sophisticated, integrated and enterprise-wide sales and marketing information products/services.
- International expansion will be attractive to vendors with the resources to address foreign markets.
- Professional services revenues will be a rapidly growing segment of the market, although they are allocated to the vertical markets of the buyers and are not calculated as a part of this forecast.

2. Recommendations to Vendors

- Software products suppliers should concentrate resources on delivering open systems-based solutions on multiple desktop equipment platforms.
- Link existing software packages to complementary systems such as word processors, workgroup software, E-Mail and other electronic communications systems.
- Provide a strong professional services capability, to customize software, integrate solutions throughout an enterprise and provide training for a fee.
- Carefully evaluate expansion into overseas markets.
- Incorporate portable device computer/communicator interfaces into solutions to better serve remote and mobile users of sales applications.

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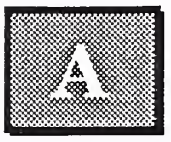

Forecast Database and Reconciliation

This appendix contains the forecast data bases and reconciliations for each of the seven cross-industry market sectors.

The cross-industry information service market forecasts are presented:

- Accounting
- Education and Training
- Engineering and Scientific
- Human Resources
- Office Systems
- Planning and Analysis
- Sales and Marketing

A Accounting

INPUT's overall accounting forecast shows higher growth in this sector between 1993 and 1994 than shown the previous year. This is due to the nearly explosive demand increase for PC-based applications software. As the largest single segment in accounting, PC software growth will be driven by the need for multiplatform client/server applications.

Exhibit A-1 presents INPUT's accounting cross-industry sector user expenditure forecast for 1994-1999. Exhibit A-2 presents a reconciliation of the 1993 and 1998 forecasts. The zero variance for the 1993 figures is an anomaly resulting from variation in information availability at the time that analysis was prepared.

Exhibit A-1

Accounting Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
Sector Total	3611	10%	3967	4404	4927	5555	6284	7075	12%
Processing Services	162	-2%	159	157	154	153	151	149	-1%
- Transaction Processing	162	-2%	159	157	154	153	151	149	-1%
- Utility Processing									
- Other Processing									
Applications Software	2954	12%	3307	3740	4260	4884	5612	6402	14%
- Mainframe	930	9%	1013	1100	1193	1289	1392	1491	8%
- Minicomputer	706	7%	752	805	865	930	995	1080	8%
- Workstation/PC	1318	17%	1542	1835	2202	2665	3225	3831	20%
Turnkey Systems	495	1%	501	507	513	518	521	524	1%
- Equipment	213	-1%	211	209	205	202	198	195	-2%
- Software Products	188	2%	192	196	200	204	208	212	2%
- Professional Services	94	4%	98	102	108	112	115	117	4%

Exhibit A-2

Accounting Cross-Industry Sector
1994 MAP Database Reconciliation

	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Product/Service Sector										
Total	3611	3611	0	0%	6222	6284	62	1%	11%	12%
Procesing Services	162	162	0	0%	139	151	12	9%	-3%	-1%
Applications Software	2954	2954	0	0%	5612	5612	0	0%	14%	14%
Turnkey Systems	495	495	0	0%	471	521	50	11%	-1%	1%

B
Education and Training

Exhibit A-3 offers the five-year forecast for education and training. Exhibit A-4 contains the reconciliation of INPUT's 1993 and 1994 market forecasts for the education and training cross-industry market. The dollar variance for the total 1993 market was $11 million, with a range of no change to $7 million for individual product and service sectors. The maximum variance was a 3% 1993 understatement, a result of stronger than anticipated growth in this market area due to both the burgeoning popularity of client/server systems and multimedia courseware, and the growing need for CBT as companies face increased education and training demands resulting from workforce changes.

Variances for 1998 reflect a continuation of increased demand for CBT, a trend most noticeable in the strong growth now forecast for the workstation/PC segment of the applications software sector. The growth of expenditures for products designed for these platforms will, in effect, drive the strong growth forecast for this cross-industry market.

Exhibit A-3

Education and Training Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
Sector Total	391	10%	432	486	547	618	701	797	13%
Processing Services	5	-20%	4	4	3	3	2	2	-13%
- Transaction Processing	5	-20%	4	4	3	3	2	2	-13%
Applications Software	242	10%	266	302	346	399	461	533	15%
- Mainframe	56	2%	57	58	59	60	61	61	1%
- Minicomputer	28	4%	29	29	30	31	31	32	2%
- Workstation/PC	158	14%	180	215	257	308	369	440	20%
Turnkey Systems	144	13%	162	180	198	216	238	262	10%
- Equipment	61	8%	66	72	78	83	89	96	8%
- Software Products	55	15%	63	71	78	85	94	104	11%
- Professional Services	28	18%	33	37	42	48	55	62	13%

Exhibit A-4

Education and Training Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Total	380	391	11	3%	625	701	76	12%	10%	12%
Procesing Services	5	5	0	0%	2	2	0	0%	-17%	-17%
Applications Software	235	242	7	3%	383	461	78	20%	10%	14%
Turnkey Systems	140	144	4	3%	240	238	-2	-1%	11%	11%

C
Engineering and Scientific

The five-year forecast is noted in Exhibit A-5. Exhibit A-6 contains the reconciliation of INPUT's 1993 and 1994 market forecasts for the engineering and scientific cross-industry market. The dollar variances are small for both the 1993 and 1998 markets, and in no case exceed 1%. This is a stable market with a structured heirarchy of products, a good portion of which are steadily and predictably migrating to smaller, more powerful and cost-effective platforms. The migration pattern is relatively clear—with most uncertainties related to the speed with which the migration to smaller platforms takes place.

Exhibit A-5

Engineering and Scientific Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
Sector Total	1087	9%	1186	1298	1432	1578	1742	1928	10%
Processing Services	129	-4%	124	118	112	106	100	94	-5%
- Transaction Processing	129	-4%	124	118	112	106	100	94	-5%
Applications Software	821	12%	917	1028	1160	1306	1470	1657	13%
- Mainframe	170	8%	183	197	211	225	238	250	6%
- Minicomputer	291	9%	317	344	373	404	436	472	8%
- Workstation/PC	360	16%	417	487	576	677	796	935	18%
Turnkey Systems	137	6%	145	152	160	166	172	177	4%
- Equipment	59	2%	60	60	61	61	62	62	1%
- Software Products	53	8%	57	61	65	69	72	75	6%
- Professional Services	25	12%	28	31	34	36	38	40	7%

Exhibit A-6

Engineering and Scientific Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market: 1993 Market (Fcst) ($M)	1993 Market: 1994 Report (Actual) ($M)	1993 Market: Variance From 1993 Forecast ($M)	1993 Market: Variance From 1993 Forecast (%)	1998 Market: 1993 Market (Fcst) ($M)	1998 Market: 1994 Report (Fcst) ($M)	1998 Market: Variance From 1993 Forecast ($M)	1998 Market: Variance From 1993 Forecast (%)	93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
Total	1084	1087	3	0%	1735	1742	7	0%	10%	10%
Processing Services	130	129	-1	-1%	100	100	0	0%	-5%	-5%
Applications Software	817	821	4	0%	1465	1470	5	0%	12%	12%
Turnkey Systems	137	137	0	0%	170	172	2	1%	4%	5%

D
Human Resources

Exhibit A-7 offers the 1994-1999 human resources forecast. It contains several significant changes from the prior version, as noted below.

Exhibit A-8, the database reconciliation, shows that the 1993 processing services market has been increased from $1.85 billion to $2.55 billion. The reason for this increase is the more precise definition of the roughly 30% share of market attributed to regional and local payroll processing vendors.. The dominant national vendors- ADP, Ceredian and Paychex- now account for about $1.75 billion annually, so the total market is determined to be 30% larger than the revenues of those leading vendors.

The applications software products market forecast has been reduced in all three platform categories, with the largest reduction coming, paradoxically, in the fastest growth segment, workstation/PC software products. Last year's forecast for 1993-1998, 25%, is now seen as too aggressive, given the strong pressures for price reductions in the desktop software industry, plus the maturity of this market. The 5-year forecast (1994-1999) is for a 17% CAGR, and the 1993-1998 figures have come down accordingly.

Exhibit A-7

Human Resources Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
Sector Total	3455	9%	3773	4100	4443	4780	5141	5481	8%
Processing Services	2550	9%	2780	3000	3240	3460	3710	3930	7%
- Transaction Processing	2550	9%	2780	3000	3240	3460	3710	3930	7%
Applications Software	810	10%	895	1000	1100	1215	1325	1445	10%
- Mainframe	270	4%	280	295	305	320	330	340	4%
- Minicomputer	280	7%	300	325	345	365	385	405	6%
- Workstation/PC	260	21%	315	380	450	530	610	700	17%
Turnkey Systems	95	3%	98	100	103	105	106	106	2%
- Equipment	40	0%	40	38	36	34	30	26	-8%
- Software Products	35	3%	36	39	42	44	46	48	6%
- Professional Services	20	10%	22	23	25	27	30	32	8%

Exhibit A-8

Human Resources Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Total	2787	3455	668	24%	4425	5141	716	16%	10%	8%
Processing Services	1850	2550	700	38%	2718	3710	992	36%	8%	8%
Applications Software	848	810	-38	-4%	1610	1325	-285	-18%	14%	10%
Turnkey Systems	89	95	6	7%	97	106	9	9%	2%	2%

E
Office Systems

Exhibit A-9 presents the 1994-1999 forecast for the office systems cross-industry market. Exhibit A-10 reconciles the 1993 and 1994 forecasts for this industry's information services expenditures.

The variance pertaining to the workstation/PC expenditure portion of the applications software delivery mode reflects the rapid introduction and acceptance of workgroup and integrated office systems, most notably the phenomenal success of Lotus Notes. Trends like this will drive this market to higher levels for PC software than forecast in 1993.

Exhibit A-9

Office Systems Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($)	Growth 93-94 (%)	1994 ($)	1995 ($)	1996 ($)	1997 ($)	1998 ($)	1999 ($)	CAGR 94-99 (%)
Sector Total	3356	12%	3759	4294	4896	5632	6479	7397	14%
Processing Services	28	-4%	27	26	24	23	21	20	-6%
- Transaction Processing	28	-4%	27	26	24	23	21	20	-6%
Applications Software	3209	12%	3610	4142	4743	5479	6329	7247	15%
- Mainframe	163	-1%	161	157	152	146	139	133	-4%
- Minicomputer	635	8%	685	735	780	820	860	895	5%
- Workstation/PC	2411	15%	2764	3250	3811	4513	5330	6219	18%
Turnkey Systems	119	3%	122	126	129	130	129	130	1%
- Equipment	51	0%	51	52	50	49	47	45	-2%
- Software Products	45	2%	46	49	51	53	53	54	3%
- Professional Services	23	9%	25	25	28	28	29	31	4%

*Exhibit A-10

Office Systems Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Total	3345	3356	11	0%	5579	6479	900	16%	11%	14%
Procesing Services	28	28	0	0%	22	21	-1	-5%	-5%	-6%
Applications Software	3198	3209	11	0%	5430	6329	899	17%	11%	15%
Turnkey Systems	119	119	0	0%	127	129	2	2%	1%	2%

F
Planning and Analyisis

Exhibit A-11 presents the detailed 1993 actual and 1994-1999 forecast of the planning and analysis cross-industry market sector.

Exhibit A-11

Planning and Analysis Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($M)	Growth 93-94 (%)	1994 ($M)	1995 ($M)	1996 ($M)	1997 ($M)	1998 ($M)	1999 ($M)	CAGR 94-99 (%)
Sector Total	2455	20%	2940	3410	3895	4450	5090	5800	15%
Processing Services	165	-9%	150	125	110	95	85	80	-12%
- Transaction Processing	165	-9%	150	125	110	95	85	80	-12%
Applications Software	2290	22%	2790	3285	3785	4355	5005	5720	15%
- Mainframe	235	9%	255	275	295	320	340	375	8%
- Minicomputer	180	0%	180	185	185	185	185	180	0%
- Workstation/PC	1875	26%	2355	2825	3305	3850	4480	5165	17%

Exhibit A-12 offers a reconciliation of the 1993 and 1994 forecasts for the planning and analysis cross-industry sector.

Exhibit A-12

Planning and Analysis Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Total	2410	2455	45	2%	5295	5090	-205	-4%	17%	16%
Procesing Services	155	165	10	6%	85	85	0	0%	-11%	-12%
Applications Software	2255	2290	35	2%	5210	5005	-205	-4%	18%	17%
Turnkey Systems	0	0	0		0	0	0			

There were minor differences between the 1993 projection for 1993 expenditures and the actual amounts noted in the 1994 report. The

maximum variance was a $10 million understatement of 1993 processing services revenues. Applications software and total revenues varied by only 2%. Greater than anticipated growth in project management applications software was the principal reason for the higher than expected growth for 1993.

The 4% negative variance in the current 1993 to 1994 forecast for the U.S. Planning and Analysis Market reflects pricing pressures in workstation/PC hardware platform products. The outlook for the industry continues very positive, with a growth rate at the high end of INPUT's estimates for both the industry-specific and cross-industry U.S. information services markets.

G
Sales and Marketing

Exhibit A-13 presents the detailed 1993 actual and 1994-1999 forecast of the sales and marketing cross-industry market sector.

Exhibit A-13

Sales and Marketing Cross-Industry Sector
U.S. Market Forecast by Product/Service Sector, 1994-1999

Product/Service Sector	1993 ($)	Growth 93-94 (%)	1994 ($)	1995 ($)	1996 ($)	1997 ($)	1998 ($)	1999 ($)	CAGR 94-99 (%)
Sector Total	1305	6%	1387	1470	1562	1643	1729	1816	6%
Processing Services	600	4%	625	650	675	695	715	735	3%
- Transaction Processing	600	4%	625	650	675	695	715	735	3%
Applications Software	380	9%	416	453	494	535	581	627	9%
- Mainframe	200	5%	210	218	225	232	238	242	3%
- Minicomputer	85	7%	91	97	103	108	113	117	5%
- Workstation/PC	95	21%	115	138	166	195	230	268	18%
Turnkey Systems	325	6%	346	367	393	413	433	454	6%
- Equipment	140	4%	146	150	155	160	165	170	3%
- Software Products	125	8%	135	145	160	170	180	190	7%
- Professional Services	60	8%	65	72	78	83	88	94	8%

Exhibit A-14 offers a reconciliation of the 1993 and 1998 forecasts for the sales and marketing cross-industry sector.

Exhibit A-14

Sales and Marketing Cross-Industry Sector
1994 Database Reconciliation

Product/Service Sector	1993 Market				1998 Market				93-98 CAGR per data '93 Rpt (%)	93-98 CAGR per data '94 Rpt (%)
	1993 Market (Fcst) ($M)	1994 Report (Actual) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)	1993 Market (Fcst) ($M)	1994 Report (Fcst) ($M)	Variance From 1993 Forecast ($M)	Variance From 1993 Forecast (%)		
Total	1327	1305	-22	-2%	1851	1729	-122	-7%	7%	6%
Processing	605	600	-5	-1%	710	715	5	1%	3%	4%
Applications Software	390	380	-10	-3%	658	581	-77	-12%	11%	9%
Turnkey Systems	332	325	-7	-2%	483	433	-50	-10%	8%	6%

Applications software growth in now forecast at a 9% CAGR during the 1993-1998 period, compared to 11% forecast in last year's sales and marketing report. The lower growth forecast is attributed to: strong downward pressures on application software prices at all levels; continuing decline of mainframe and minicomputer equipment shipments; the user tendency in some vertical markets to require industry-specialized solutions rather than cross-industry ones.

Turnkey systems' CAGR is now reduced to 6% for the period 1993-1998, down from the 8% noted in last year's report. This is primarily due to the continuing downward pressure on equipment prices, plus the move of a number of former turnkey providers, especially at the desktop platform level, into a more focused role as software providers.

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